Pretty Tree Bench Vegetation Project

Final Environmental Impact Statement

Escalante Ranger District

ERRATA SHEET

Please make the following corrections to the Pretty Tree Bench Vegetation Project FEIS. On page 18 of Chapter 3, change the second sentence of the first paragraph to: As part of the nationwide Roadless Area Review and Evaluation (RARE and RARE II) in the **1970'**s and a subsequent local inventory in **1983**, the IRA's listed below were identified.

FINAL ENVIRONMENTAL IMPACT STATEMENT

PRETTY TREE BENCH VEGETATION PROJECT
DIXIE NATIONAL FOREST
ESCALANTE RANGER DISTRICT

Garfield County, Utah
February, 2000

USDA Forest Service

Responsible Official
Forest Supervisor
Dixie National Forest

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ABSTRACT

This Final Environmental Impact Statement documents the analysis of the No Action, Proposed Action, and three action alternatives developed for the Pretty Tree Bench Project area. The Proposed Action and action alternatives considered in detail, are consistent with current management direction. Each alternative responds differently to the issues associated with the Proposed Action.

The Proposed Action prescribes disturbances within a number of different vegetation types throughout the project area. One disturbance practice uses prescribed fire. The acres of treatment by vegetation type through the use of prescribed fire are: Sagebrush (200-250 acres), Gambel Oak (450-500 acres), Pinyon/Juniper (3000-3500 acres), Ponderosa Pine underburn (7000 acres), Mixed conifer underburn (300-350 acres), and Aspen regeneration burn (700 acres).

A second disturbance practice that is proposed will be the commercial and non-commercial cutting of trees. Where aspen is being invaded by conifer trees, the conifer trees will be cut and removed (1000 acres). Where aspen can be commercially harvested, the aspen will be sold by bid (302 acres).

The Proposed Action will also seed burned areas within the sagebrush and pinyon/juniper vegetation types, if ground cover does not establish. Native plant seed will be emphasized, but non-native plant seed can be used. Seeding will be done by hand or by aerial application.

Travel management is also a part of the Proposed Action. The Proposed Action also states that no road construction or reconstruction would occur. The overall travel management strategy provides

for a variety of vehicle uses, and describes year long and seasonal use opportunities. An OHV trail starting from the Dry Lake Trailhead and looping around Haws Pasture would be designated and constructed. The overall management would follow a closed unless designated open philosophy. Alternative 1 uses prescribed fire rather than commercial cutting of aspen. Alternative 2 has reduced commercial and non commercial aspen cutting by only using chainsaw disturbance outside of previously inventoried roadless areas. Alternative 3 reduces commercial aspen harvest to those areas west of the allotment fence. All action alternatives include different travel management practices. Alternatives 1 and 3 reconstruct a short portion of Road Draw Road. Alternative 2 uses native seed for ground cover establishment in those areas that need seeding.

The Forest Service preferred alternative is the Proposed Action.

SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED PRETTY TREE BENCH VEGETATION PROJECT

INTRODUCTION

Changes between the Draft and Final Environmental Impact Statement are based on information and comments received during the Draft scoping period.

1. PURPOSE AND NEED FOR ACTION

The Proposed Area

The Escalante Ranger District of the Dixie National Forest is proposing several vegetation improvement projects in the Pretty Tree Bench area, west of Boulder, Utah. The area of the proposed project is located adjacent to the private lands in Salt Gulch and Haws Pasture. The legal description is:

Sections 8, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32 and 33
Township 32 South, Range 4 East, Salt Lake Base Meridian

Sections 23, 24, 25, 26, 27, 28, 33, 34, 35, and 36
Township 32 South, Range 3 East, Salt Lake Base Meridian

Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, and 36
Township 33 South, Range 3 East, Salt Lake Base Meridian

Sections 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 27, 28, 29, 30, 31, 32, 33, and 34
Township 33 South, Range 4 East, Salt Lake Base Meridian

Implementation of the proposal would take place over the next 1 to 8 years.

The Proposed Action, Purpose and Need

The proposed action would implement management direction and projects identified in the Dixie National Forest Land and Resource Management Plan (LRMP). This project EIS will be tiered to the LRMP EIS, which provides goals, objectives, standards, and guidelines for the various activities and land allocations on the Forest.

Purpose

The vegetation in the treatment area generally lacks age and structural diversity due in part to the absence of fire disturbance. The purpose of the Pretty Tree Bench Vegetation Project is to provide the appropriate levels of prescribed fire and other management actions to create healthier vegetation conditions, enhance elk and deer winter range, reduce ground and ladder fuels, create a young stand structure and reduce stand densities within the pinyon pine/juniper stands.

Forest Plan Direction

This Environmental Impact Statement is tiered to the Final Environmental Impact Statement for the Dixie National Forest Land and Resource Management Plan.

Management Objectives

1. Reduce the risk of unnatural, high intensity wildfires.
2. Strengthen ecological sustainability.
3. Strengthen economic sustainability.
4. Provide better management of the road network.
5. Provide for a variety of recreational experiences.
6. Improve forage on big game winter range areas.

Decision to Be Made

The Forest Supervisor of the Dixie National Forest is the official responsible for deciding on the proposed Pretty Tree Bench Vegetation Project. The Supervisor will decide:

1. The level of timber harvest to be used in achieving the age-class and structural diversity balance.

2. Undeveloped character within mapped RARE II areas, roadless inventory areas of 1983/1984, and other unroaded/undeveloped areas that will be maintained.

3. Whether or not portions of Road Draw Road where inadequate water drainage from the road exists and where the road crosses a wet meadow, should be repaired.

5. Whether or not motorized use of Road Draw Road and development of an OHV loop trail will be permitted within the roadless areas mentioned in #3 above.

6. The closure of Road Draw Road. The County considers Road Draw Road as a RS-2477 road, and asserts that the County has jurisdiction over the road. Road Draw Road is recorded as a historical overland route connecting the towns of Loa and Bicknell in Wayne County to the Town of Boulder in Garfield County.

7. The use and application of non-native plant seed.

2. ALTERNATIVES

The range of alternatives and the mitigations presented in the FEIS were determined from the scope of the proposal. The scope was largely defined by the project Propose and Need.

Alternatives Considered, Mitigation Measures and Management Requirements

The Interdisciplinary Team, following responsible official briefings developed five alternatives for detailed analysis. Specific mitigation measures and management requirements for all action alternatives are detailed in Chapter 2 of FEIS.

Alternatives Eliminated from Further Study

A. This alternative would have used chaining or roller chopping as a method of mechanized pretreatment of fuels within the pinyon/juniper burn treatment areas.

B. This alternative would have used commercial timber sales to accomplish all of the aspen regeneration treatments.

C. This alternative would have removed or reduced livestock grazing and allowed fire from natural ignition sources only to achieve objectives.

Alternatives Considered in Detail

No Action

This is the No Action alternative. Proposed vegetation treatment activities would not take place at this time. Considerations of such activities in the future would not be precluded. Existing activities such as personal use fuelwood cutting, livestock grazing, fire protection, OHV riding, and recreational pursuits of motorized and non-motorized uses would continue. The No Action alternative serves as a benchmark to compare the environmental effects of the action alternatives.

Opportunities to provide ecosystem sustainability be increasing younger vegetation classes would be foregone. Developing more forage for big game on its winter range would not be implemented; and reducing the risk of large catastrophic fire would not be achieved. This would continue to threaten the long term sustainability of old growth vegetation types.

Additionally the management need to place motorized travel on designated routes would not occur. Economic sustainability would also be lessened because commercial forest products would not be offered.

Proposed Action

The Proposed Action is designed to enhance age and structural diversity within the various vegetation types, enhance elk and deer winter range, and reduce fuel accumulations, both ground and ladder, using both prescribed fire and mechanical treatment methods.

Treatments by Vegetation Type

Sagebrush - Within the 1,542 acre sagebrush vegetation type, approximately 200-250 acres would be treated using stand replacement prescribed fire, to create a mosaic pattern of differing age classes. Following the burn, seeding would be done to restore disturbed areas and to provide big game forage. Native seed would be emphasized except in areas where rapid growth non-native species are needed for erosion control and big game forage production.

Gambel oak - Within 1,861 acres of oak, approximately 450-500 acres would be treated using stand replacement fire, to develop a diversity of age classes throughout the project area. In 3-5 years, a second burn may be completed to reduce fuel loading.

Pinyon/Juniper - Within 15,062 acres, treat approximately 3,000-3,500 acres using hand felling and stand replacement prescribed fire. Tree cutting would be completed where necessary to create sufficient ground fuels to sustain fire or release small patches of understory vegetation. The treatment is designed to create greater diversity of structure and age classes, and enhance understory growth of grasses, forbs, and shrubs. Native seed would be emphasized except in areas where rapid growth non-native species are needed for erosion control and big game forage production.

Ponderosa pine - Treat approximately 7,000 acres of the 7,495 acres using low intensity surface prescribed fire. This method has been chosen to reduce ground and ladder fuels, release nutrients tied up in the fuel accumulations, protect plantation investment, and re-introduce fire disturbance. A second surface fire treatment would occur within 5 years.

Mixed conifer - Treat approximately 300-350 acres of the 1,140 acres of mixed conifer stands, using a low intensity surface prescribed fire. Similar to the ponderosa pine, the intent of this treatment is to reduce ground and ladder fuels, release nutrients, and re-introduce fire disturbance. Again, a second fire treatment would occur within 5 years.

Aspen - Within 3,366 acres of aspen, the following treatments are proposed:

> Aspen Burn - Regenerate approximately 700 acres of aspen using prescribed fire. Prior to burning, conifer trees may be cut where necessary to create additional fuels sufficient to meet burn objectives. Following treatment, if monitoring determines a regeneration problem associated with excessive browsing by livestock and wildlife, a fence would be constructed around the burn area to assure regeneration success.

Aspen Maintenance - Treat approximately 1,000 acres of aspen by removing understory conifer trees using non-commercial methods. The material would be available for personal collection of posts and poles.

Aspen Harvest - Regenerate approximately 302 acres of aspen using commercial methods to remove all trees. This treatment would occur in harvest units up to 40 acres in size, and would take place in suitable stands having existing access.

Travel Management - Along with the vegetation treatment, a travel management strategy for the project area was developed. This strategy will provide for a variety of vehicle uses (OHV, 4X4, and general highway vehicles) utilizing year long or seasonal use. Some roads will be opened year long, other roads will be open seasonally or closed year long. An OHV trail starting from The Dry Lake trailhead and looping around Haws Pasture would be designated and constructed. The project area will be closed to motorized travel unless designated open, except for snowmobiles which are accepted uses on snow. Snowmobiles are not permitted in big game winter range.

Alternative 1

This alternative was derived from significant issues identified by the Interdisciplinary Team (IDT) during the scoping process. Among the public responses received, there were comments to eliminate timber harvest treatments and improve certain sections of Road Draw. Accordingly, Alternative 1 was created. Alternative 1 is identical to the Proposed Action except;

- timber harvest in the aspen will not occur
- aspen stand replacement fire will be increased to 1,000 acres to meet aspen regeneration objectives
- minor portions of Road Draw, west of the cattleguard will be reconstructed.

Alternative 2

This alternative was derived from significant issues identified by the Interdisciplinary Team (IDT) during the scoping process. Among the public responses received, there were comments to eliminate mechanical treatments in identified roadless areas and motorized use in the north central portion of the project area, as well as utilize native seed only in restoring treatment areas. Accordingly, Alternative 2 was created. Alternative 2 is identical to the Proposed Action except;

- treat 300-350 acres of pinyon/juniper, of which 38 acres may have tree cutting
- treat approximately 830 acres of aspen with fire, of which 445 acres may cut conifer trees for fuel treatment

- treat 425 acres of aspen with removal of understory conifer trees
- regeneration harvest of 166 acres of aspen
- utilize native seed only
- Travel management would entail closure of Road Draw to motorized travel and the elimination of the OHV loop trail.

Alternative 3

This alternative was derived from significant issues identified by the Interdisciplinary Team (IDT) during the scoping process. Among the public responses received, there were comments to preserve undeveloped areas located in the north central portion of the project area from further developments, improve several portions of the Road Draw road, and reduce vehicle access Accordingly, Alternative 3 was created. Alternative 3 is identical to the Proposed Action except;

- treat 800 acres of aspen with fire of which portions west of the allotment fence may use fuel treatment cutting
- treat 650 acres of aspen with understory conifer tree removal
- regeneration harvest of 204 acres of aspen
- minor portions of Road Draw west of the cattleguard would be reconstructed
- Travel management would entail seasonal closure of Road Draw from the cattleguard east to FR 166, as well as seasonal closure of the OHV trail loop

Identification of the Preferred Alternative

The preferred alternative is the Proposed Action.

3. AFFECTED ENVIRONMENT

The FEIS describes the baseline environment of the area that would be affected or created by the alternatives considered. The affected environment includes resources important to the analysis areas, and resources that must be addressed due to Federal Law or regulations. These items are listed below in the order they appear in the FEIS.

3.1 Vegetation
3.2 Recreation
3.3 Roadless/Undeveloped
3.4 Visual Quality
3.5 Soils
3.6 Watershed
3.7 Fisheries
3.8 Wildlife
3.9 Fire

3.10 Heritage Resources
3.11 Socio-Economic
3.12 Air Quality
3.13 Livestock Grazing
3.14 Special uses and Minerals
3.15 Travel Management

4. ENVIRONMENT CONSEQUENCES

The major effects of the evaluated alternatives on the issues and resources are summarized for comparison in Table 2.3.6 of the FEIS. This table is intended to provide a quick comparison of the alternatives in the FEIS. The alternatives are also compared to the purpose and need in Table 4.5.

For a detailed description of the alternative effects on major issues and other resources, see Chapter 4 of the FEIS.

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CHAPTER 1

PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The Escalante Ranger District of the Dixie National Forest is proposing several vegetation improvement projects in the Pretty Tree Bench area, west of Boulder, Utah. The area of the proposed project is located adjacent to the private lands in Salt Gulch and Haws Pasture. The legal description is:

Sections 8, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32 and 33
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(Refer to maps A and B, Appendix 3)

Implementation of the proposal would take place over the next 1 to 8 years.

1.2 PROPOSED ACTION, PURPOSE AND NEED

The proposed action would implement management direction and projects identified in the Dixie National Forest Land and Resource Management Plan (LRMP). This project EIS will be tiered to the LRMP EIS, which provides goals, objectives, standards, and guidelines for the various activities and land allocations on the Forest.

PURPOSE

The vegetation in the treatment area generally lacks age and structural diversity due in part to the absence of fire disturbance. The purpose of the Pretty Tree Bench Vegetation Project is to provide the appropriate levels of prescribed fire and other management actions to create healthier vegetation conditions, enhance elk and deer winter range, reduce ground and ladder fuels, create a young stand structure and reduce stand densities within the pinyon pine/juniper stands.

1.2.1 PROPOSED ACTION

This area was selected for two primary reasons. First, the landscape assessment indicated that large imbalances in vegetation structure occur here. This imbalance needs attention if we are to achieve the proper vegetation conditions. Second, because the location does have many different vegetation types within this concentrated area, the Forest Service will be more efficient at achieving objectives by working in this concentrated area.

Two vegetation types that show large age imbalances are the pinyon/juniper and the seral aspen types. Age class distribution and creation of seedling classes needs to be established so that these become sustainable through time. These reasons along with the stated activity needs for each vegetation type, create the need for action.

The Proposed Action, purpose and need includes the following activities: (Refer to Appendix 3, Map H).

Sagebrush - Treat approximately 200-250 acres of sagebrush using prescribed fire. Immediately following the burn, portions of the burn area will be seeded under the direction of the Forest's interim guideline which emphasizes native plant seed; and non-intrusive, non-native species, if needed to meet the objectives. Seeding would first control any soil erosion hazards, and then provide for supplementing availability of forage for wildlife. Some cutting of scattered pinyon/juniper with chainsaws may be done to create additional fuel to carry fire.

This activity is **needed** because:

Age class variety within the sagebrush component is inadequate. By creating disturbance through fire, younger age classes would be developed which would create a healthier sagebrush community. The treatment would increase wildlife forage in winter range areas and winter food would become more available.

Gambel Oak - Treat approximately 450-500 acres of oak vegetation with prescribed fire. After a 3-5 year period, burn the area again to reduce fuels that might have accumulated from the original burn. This repeat burn would be done where fuel loads exceed 5-7 tons per acre.

This activity is **needed** because:

Exclusion of fire within this type has resulted in a single aged stand structure throughout the area. Creating fire disturbance on approximately 1/3 of the existing oak vegetation type would begin to move these acres toward their desired condition. The reburn in the oak type is needed to reduce fuel levels to 5-7 tons per acre. This accumulation occurs as dead vegetation falls to the ground after the initial burn.

Pinyon/Juniper - Treat approximately 3,000-3,500 acres of pinyon/juniper by using hand felling with chainsaws and burning. Following the burn, portions of the area would be seeded following the Forest's interim guideline. The primary purpose of the seeding will be to control erosion. The secondary purpose will be to provide additional forage for wildlife.

This activity is **needed** because:

Pinyon/juniper vegetation across the entire landscape is dominated by dense, continuous, unchanged acres of pinyon and juniper. This vegetation condition is not the desired condition, and changes to this structure and age class would provide for earlier vegetation succession conditions. This change would promote ecosystem health by reducing pinyon/juniper density, creating more age classes, and bringing about more growth of shrub, grass and forb species. The areas value as big game winter range would also be enhanced through the creation of more food species.

Ponderosa Pine - Within the ponderosa pine vegetation type, use prescribed fire on approximately 7,000 acres. After a 3-5 year period, burn the area again in order to reduce additional fuels which result from fallen needles and limbs. Because much of the area has been reforested by planting, the underburn would protect this investment, and stocking levels would attain or exceed stocking standards following the burn.

This activity is **needed** because:

Unnatural fuel accumulation has created a fuel loading problem throughout the ponderosa pine type. These fuel loads are estimated to be from 8-16 tons per acre. The desired fuel loading is less than 7 tons per acre. Should a wildfire occur, these acres would be vulnerable to large scale, high intensity, stand replacement episodes. Fire activity of this kind is not desired, and controlled ignition is needed to bring the area back into a more natural fire regime. This treatment would maintain ponderosa pine stand components and reduce wildfire risk.

Mixed Conifer - Treat approximately 300-350 acres of mixed conifer using low-intensity prescribed fire. After a 3-5 year period, burn the area again in order to reduce additional fuels.

This activity is **needed** because:

Decades of fire exclusion has resulted in high levels of fuel loadings and an increase in shade tolerant trees. The fuel loading is estimated to be from 10-20 tons per acre. Wildfire, should ignition occur, would result in extreme burn intensities and large scale tree morality. Controlled burning is needed to minimize the chance of this happening.

Aspen Burn - Treat approximately 700 acres of aspen using prescribed fire. Prior to burning, conifer trees may be cut so that fuels are available to carry the fire through each stand. Following treatment, if monitoring determines a regeneration problem associated with excessive browsing by livestock and wildlife, a fence would be constructed around the burn area to assure regeneration success.

This activity is **needed** because:

The younger aspen age classes are insufficient in acreage to provide for age and structure diversity which would strengthen the overall health of the aspen vegetation. Prescribed fire would be utilized in areas having marginal to no commercial opportunity.

Aspen Noncommercial Cutting (Maintenance) - Treat approximately 1,000 acres of aspen by removing the encroaching understory of conifer trees through noncommercial cutting.

This activity is **needed** because:

The younger aspen age classes are insufficient in acreage to provide for age and structure diversity which would strengthen the overall health of the aspen vegetation. The invading conifer trees would be removed so that succession is set back and larger diameter aspen persists on the landscape creating a more pure aspen stand condition.

Aspen Regeneration Harvest - Regenerate approximately 302 acres of aspen by commercially and/or non-commercially cutting all trees. This treatment would occur in harvest units up to approximately 40 acres in size. The units are placed in suitable aspen stands having existing access.

This activity is **needed** because:

The younger aspen age classes are nearly nonexistent. Younger aspen are needed to provide for age and structure diversity which would strengthen the overall health of the aspen vegetation.

Reseeding - The Proposed Action would emphasize the use of native plant seed in restoring disturbed areas. However, when restoring or rehabilitating disturbed or degraded lands to proper functioning condition, non-intrusive non-native plant species can be considered for use where native species (1) are not available, (2) are not economically feasible, (3) cannot achieve desired objectives as well as non-native species, (4) cannot compete with already established non-native species, and/or (5) have failed to meet objectives. Seeding would be done by hand or by aerial application (Dixie National Forest, Interim Guide).

Wilderness - No management activities are planned in the Box-Death Hollow Wilderness Area.

Travel Management Plan - No new road construction or reconstruction would occur. The proposed travel management strategy would provide for a variety of vehicle uses (all-terrain to general highway vehicles) utilizing some year-long and some seasonal use. Some roads would be opened year-long. Other roads would be opened seasonally, and some closed year-long. An OHV trail starting from the Dry Lake Trailhead and looping around Haws Pasture would be designated and constructed. The area would be closed to motorized travel with designated routes open. Over snow machines would be permitted on snow except within big game winter range, (DNF LRMP Final Management Area Map). Map H in Appendix 3 illustrates the proposed vegetation treatments and travel management strategy for the Proposed Action.

1.2.2 NATURAL RESOURCE AGENDA

The Proposed Action contributes to all four emphasis areas that have been identified in the natural resource agenda. (Charting Our Future-A Nations Natural Resource Legacy; USDA, October, 1998; FS-630.)

Watershed Health and Restoration

Vegetation compositional changes and increasing densities are expanding the risk of unnatural, high intensity fires. This high level of risk jeopardizes ecological balance within the area (Properly Functioning Condition Assessment), which leads to current watershed conditions which are not as healthy as they should be. Changes in vegetation structure and composition will adjust this imbalance.

Sustainable Forest Management

Ecological sustainability within the project area has declined because disturbance patterns have not occurred frequently enough on the landscape. Economic sustainability also can be provided in an environmentally responsible manner. By using fire and timber harvest, disturbance features will again be placed into the area, and needed vegetation changes will occur. Important as well, is sustaining rural communities by providing jobs based on use of forest resources. This proposal promotes environmentally sensitive economic development and jobs based on the use of these resources.

National Forest Roads

Presently, the open road density within the project area falls well below the Dixie National Forest LRMP standard and guideline (no greater than 2 miles of open road per square mile). Even though the density is low, two elements exist which conclude that better management can be given to this road network. These two conditions are road maintenance and substandard road access.

Regarding road maintenance, a number of roads within the project area have not been adequately maintained and therefore have both public safety and environmental condition concerns. The Proposed Action will keep open those roads which offer safe, responsible and environmentally appropriate public travel. Substandard roads have also developed through unplanned access travelways which have not been constructed to necessary standards. Implementing a motorized closure with designated routes open, would prevent any further development of unplanned access. The Proposed Action will designate open travel routes, thereby managing a proper road network within the project area. No road construction is planned in any alternative, and roadless areas will have no road development.

Recreation

Forest users experience outdoor recreation opportunities through a number of different ways throughout the project area. The majority of these uses are associated with sight seeing/driving for pleasure (motorized use), dispersed camping and hunting. Some hiking occurs along the Great Western Trail. This broad spectrum of existing and growing use suggests that motorized and non-motorized uses are meaningful recreational opportunities within the area.

The Proposed Action describes a setting which will meet a variety of these recreational experiences. Non-motorized travel will be maintained in inventoried roadless areas, responsible and environmentally sensitive OHV travel will be fostered by having designated routes on constructed trails and roads, and environmentally sensitive recreation use will be provided by having designated open motorized travel routes. The Proposed Action is tailored to meet visitor needs, and to provide high quality recreation experiences.

1.3 FOREST PLAN DIRECTION

Two levels of planning are involved in management of the Dixie National Forest. The first level of planning is the development of a Forest Land and Resources Management Plan (LRMP) that provides direction for all resources management programs, practices, uses, and protection measures. The Dixie National Forest LRMP (1986), the Forest Plan Final Environmental Impact Statement (FEIS) 1986, and the Record of Decision (1986) consist of both forest-wide and area specific standards, guidelines, and goals that provide for land uses under a given set of management constraints. The management direction provided by this Forest LRMP comprises the sideboards within which project

planning (the second planning level) and activities take place. The Forest Plan EIS also contains a general cumulative effects analysis of the anticipated overall forest management program.

The Forest LRMP, based on considerations addressed in the FEIS, guides natural resource management activities using established standards and guidelines for management of the Dixie National Forest. The Forest wide standards and guidelines (S&G's) describe measures to be applied to all lands on the Dixie National Forest unless superseded by specific management area S&G's. Implementation of the Forest wide and specific management area S&G's would move the project area towards the "Desired Future Condition" (DFC) described in the Forest Plan.

The proposed Pretty Tree Bench project area falls within 7 management areas described in the Dixie National Forest Land and Resource Management Plan. These are:

2A - Semi-Primitive Recreation
2B - Roaded Natural Recreation
5A - Big Game Winter Range
6A - Livestock Grazing
7A - Wood Productions and Utilization
8A - Wilderness
8A2 - Box Death Hollow Exclusion

(Refer to Map E, Appendix 3)

The second level of planning occurs during implementation of the Forest LRMP. This planning level involves the development, analysis, and disclosure of implementing specific proposed projects designed to achieve the overall goals and objectives of the Forest LRMP.

This Pretty Tree Bench planning analysis incorporates by reference the direction provided in the Forest LRMP (1986). As a project specific analysis, this second level of planning is not intended to re-examine the basic land use allocations made through the first level of planning, the Forest LRMP, nor to propose broad changes in those land use allocations.

1.4 NATURE OF DECISION TO BE MADE

The decision to be made for the proposed Pretty Tree Bench action is: should the projects take place as proposed, take place by an alternate method, or not take place. The Forest Supervisor, Dixie National Forest is the responsible official for this project.

1.5 PUBLIC PARTICIPATION

A proposed Pretty Tree Bench Burn project scoping was initiated on January 23, 1998 , when a letter and scoping notice which described the proposed action was mailed to all parties who had expressed an interest in vegetation management proposals on the Escalante Ranger District. This proposal included only the treatments associated with the pinyon/juniper and sagebrush vegetations.

Based on comments received and additional analysis completed by the Forest Service specialists, a decision was made to expand the scope of the original burn proposal. The proposal was expanded to

include treatments in the other vegetation types listed above in the Proposed Action. On June 30, 1998 a new scoping notice was mailed which amended the original proposal.

From both scoping processes, twenty-one written responses and two telephone responses were received. Members of the Interdisciplinary Team (IDT) provided a briefing of the proposal to the City Council of Boulder, Utah on February 4, 1998. On September 15, 1998, the IDT met with interested individuals (Liz Thomas, Michael Garrity, Dave Mock, and Mark Austin) and received their comments on the proposed project.

The Notice of Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register on November 16, 1998. The Draft Environmental Impact Statement was mailed on May 6, 1999, and the review period ended July 6, 1999. Appendices 4 and 5 discuss comments to the DEIS specifically.

1.6 ISSUES RELEVANT TO THE DECISION

Scoping for the Pretty Tree Bench proposed action included correspondence, meetings, and telephone conversations with interested individuals, organizations, businesses and agencies.

The Interdisciplinary Team (IDT) compiled responses, categorized the comments and identified potential issues. Issues are defined as unresolved problems, conflicts, or controversies which would result with implementation of the proposed action. The issues provide the focus for the analysis of effects and development of any alternatives to the Proposed Action.

The issues for this analysis include:

1. Use of timber harvest as a method for achieving the age-class and structural diversity.
2. Maintaining an undeveloped character within mapped RARE II areas, roadless inventory areas of 1983/1984, and roadless inventory areas of 1997.
3. Maintaining an undeveloped character only in those portions of the RARE II area and other roadless inventory areas which still retain undeveloped characteristics.
4. Resource damage resulting from vehicular traffic on portions of Road Draw Road where inadequate water drainage from the road exists and where the road crosses a wet meadow.
5. Continued motorized use of Road Draw Road and development of an OHV trail loop could be an intrusion within the roadless areas mentioned in #3 above.
6. Closure of Road Draw Road could cause conflict with the County of Garfield. The County considers Road Draw Road as a RS-2477 road, and asserts that the County has jurisdiction over the road. Road Draw Road is recorded as a historical overland route connecting the towns of Loa and Bicknell in Wayne County to the Town of Boulder in Garfield County.
7. Use and application of non-native plant seed in some burn areas might be detrimental to the natural ecosystem.

Comments and other concerns raised during the scoping process which were determined not to constitute issues were incorporated by the IDT by amending the proposed action or by designing appropriate mitigation measures. A complete list of issues, comments and concerns raised, along with an explanation of how each was addressed can be found in the project analysis file. The project file also contains copies of all correspondences, a record of all telephone conversations and meeting minutes.

1.7 PERMITS, LICENSES, AND OTHER ENTITLEMENTS

The analysis area lies within National Forest System lands, exclusive of private lands in Salt Gulch and Haws Pasture. No activities are proposed on private lands. No federal permits, licenses or entitlements would be needed prior to implementing prescribed fire activities, permits identified in the Utah Smoke Management Plan (7/20/99), would be obtained. Associated with the Proposed Action, there are no potential conflicts with the plans and policies of other jurisdictions. One issue identified which would close Road Draw Road to vehicular traffic may conflict with Garfield County's identification of Road Draw Road as having RS-2477 status. The Grand Staircase-Escalante National Monument lies adjacent to the southern boundary of the analysis area.

CHAPTER 2

ALTERNATIVES

2.1 INTRODUCTION

This chapter displays detailed information about No Action, the Proposed Action and Alternatives 1, 2, and 3. It is organized as follows: Section 2.2 discusses the reasonable range of alternatives and describes alternatives that were considered but eliminated from detailed study, along with the rationale for eliminating them from further study. Section 2.3 describes the alternatives considered in detail, including No Action, the Proposed Action and Alternatives 1, 2, and 3. The emphasis, activities, outputs, application of LRMP standards and guidelines and mitigation measures are presented for the action alternatives.

2.2 RANGE OF ALTERNATIVES

The range of alternatives and the mitigations presented below were determined from the scope of the proposal. This scope was largely defined by the purpose and need listed in Chapter 1. Other influences on the scope of the project included LRMP direction (desired future condition, goals and objectives, standards and guidelines), Federal laws, regulations, policies, and public comments. The IDT considered all of these criteria in the development of alternatives. Within the parameters noted above, the alternatives developed exhibit a reasonable range of outputs, treatments, mitigation, requirements, and effects on resources.

2.2.1 ALTERNATIVES ELIMINATED FROM FURTHER STUDY

In considering a range of alternatives, the IDT looked at an array of options from no treatment to the proposed treatments. The alternatives shown below were based on concerns identified in the scoping process. These alternatives were considered and then dropped without detailed analysis.

One alternative considered the use of chaining or roller chopping as a method of mechanized pretreatment of fuels within the pinyon/juniper burn treatment areas. Due to the potential of archeological resources likely to occur within these areas, this alternative was dropped from further consideration due to the risk to archeological disturbance and intensive survey requirements.

Another alternative explored the use of commercial timber sales to accomplish all of the aspen regeneration treatments. Commercial timber sales within the proposed aspen burn treatment areas would require extensive road construction to facilitate timber removal. Due to the low value of aspen, such road construction would be uneconomical. The Interim Roads Rule also prohibits road construction within this area (Ref Appendix 3, Map F) because it falls within suspension category 2. Therefore, this alternative was dropped from further consideration.

During the scoping process, comment was received which suggested that the project goals could be attained by removing or reducing livestock and allowing natural fire. This alternative was considered but eliminated from detailed study. The appropriateness of livestock grazing and the decision to provide for livestock forage was made in a previous decision (Environmental Assessment Issuance of 10 year Term Grazing Permits - Escalante Ranger District, 1995). Given the decision to graze livestock, removing or greatly reducing livestock numbers would be inconsistent and is therefore outside the scope of this project. The use of wildland fire is currently being analyzed in a separate project. Because this area should receive treatment within 1-8 years to move toward Properly Functioning Condition of the ecosystem, waiting for random starts associated with wildland fire, and likely having burn conditions which may exceed optimal conditions, presents too much risk to the environment. Action through management ignition needs to take place.

2.3 ALTERNATIVES CONSIDERED IN DETAIL

The alternatives considered in this Section were formulated from the issues and concerns identified in the scoping process, the project objectives, goals, and desired future conditions described in the Properly Functioning Condition Assessment and LRMP. The ID Team used a systematic, interdisciplinary approach to identify the issues and concerns, to formulate the alternatives, to analyze the affected environment, to estimate the environmental impacts, and to write the Environmental Impact Statement.

In addition to No Action and the Proposed Action, the ID Team developed three action alternatives. All five are described below.

2.3.1 NO ACTION

This is the No Action alternative. Proposed vegetation treatment activities would not take place at this time. Considerations of such activities in the future would not be precluded. Existing activities such as personal use fuelwood cutting, livestock grazing, fire protection, OHV riding, and recreational pursuits of motorized and non-motorized uses would continue. The No Action alternative serves as a benchmark to compare the environmental effects of the action alternatives.

Opportunities to provide ecosystem sustainability by increasing younger vegetation classes would be foregone. Developing more forage for big game on its winter range would not be implemented; and reducing the risk of large catastrophic fire would not be achieved. This would continue to threaten the long term sustainability of old growth vegetation types.

Additionally, the management need to place motorized travel on designated routes would not occur. Economic sustainability would also be lessened because commercial forest products would not be offered.

2.3.2 THE PROPOSED ACTION

Summary of Proposed Action

Veg. Type	Sagebrush	Oak	Pinyon/ Juniper	Ponderosa Pine	Mixed conifer
Action	Burn 200-250 acres, seed, cut scattered PJ to carry fire.	Burn 450-500 acres. Repeat 3-5 years if needed	Cut and burn 3000-3500 acres, reseed post burn	Burn 7000 acres. Repeat 3-5 years	Burn 300-350 acres. Repeat 3-5 years.
Veg. Type	**Aspen Burn**	**Aspen Maintenance**	**Aspen Regen. Harvest**	**Reseeding**	**Travel Management**
Action	Burn 700 acres (prior cutting of conifer if needed) fence if needed.	Cut 1000 acres understory conifer.	Within 1332 acres, cut 302 as commercial and non-commercial $\leq$ 40 acre size.	Emphasize native seed in restoring distur-bed areas, non-native where necessary for erosion, and big game.	Closure per Appendix 3 Map H

The Proposed Action is designed to enhance age and structural diversity within the various vegetation types, enhance elk and deer winter range, and reduce fuel accumulations, both ground and ladder, using both prescribed fire and mechanical treatment methods.

Treatments by Vegetation Type

Sagebrush - Within the 1,542 acre sagebrush vegetation type, approximately 200-250 acres would be treated using stand replacement prescribed fire, to create a mosaic pattern of differing age classes. Following the burn seeding would be done to restore disturbed areas and to provide big game forage. Native seed would be emphasized except in areas where rapid growth non-native species are needed for erosion control and big game forage production.

Gambel oak - Within 1,861 acres of oak, approximately 450-500 acres would be treated using stand replacement fire, to develop a diversity of age classes throughout the project area. In 3-5 years, a second burn may be completed to reduce fuel loading.

Pinyon/Juniper - Within 15,062 acres, treat approximately 3,000-3,500 acres using hand felling and stand replacement prescribed fire. Tree cutting would be completed where necessary to create sufficient ground fuels to sustain fire or release small patches of understory vegetation. The treatment is designed to create greater diversity of structure and age classes, and enhance understory growth of grasses, forbs, and shrubs. Native seed would be emphasized except in areas where rapid growth non-native species are needed for erosion control and big game forage production.

Ponderosa pine - Treat approximately 7,000 acres of the 7,495 acres using low intensity surface prescribed fire. This method has been chosen to reduce ground and ladder fuels, release nutrients tied up in the fuel accumulations, protect plantation investment, and re-introduce fire disturbance. A second surface fire treatment would occur within 5 years.

Mixed conifer - Treat approximately 300-350 acres of the 1,140 acres of mixed conifer stands, using a low intensity surface prescribed fire. Similar to the ponderosa pine, the intent of this treatment is to reduce ground and ladder fuels, release nutrients, and re-introduce fire disturbance. Again, a second fire treatment would occur within 5 years.

Aspen - Within 3,366 acres of aspen, the following treatments are proposed:

Aspen Burn - Regenerate approximately 700 acres of aspen using prescribed fire. Prior to burning, conifer trees may be cut where necessary to create additional fuels sufficient to meet burn objectives. Following treatment, if monitoring determines a regeneration problem associated with excessive browsing by livestock and wildlife, a fence would be constructed around the burn area to assure regeneration success.

Aspen Maintenance - Treat approximately 1,000 acres of aspen by removing understory conifer trees using non-commercial methods. These trees would be available for personal use as posts and poles.

Aspen Harvest - Regenerate approximately 302 acres of aspen using commercial methods to remove all trees. This treatment would occur within 1,332 acres of aspen, in harvest units up to 40 acres in size, and would take place in suitable stands having existing access.

Travel Management - Along with the vegetation treatment, a travel management strategy for the project area was developed. This strategy will provide for a variety of vehicle uses (OHV, 4X4, and general highway vehicles) utilizing year long or seasonal use. Some roads will be opened year long, other roads will be open seasonally or closed year long. An OHV trail starting from The Dry Lake trailhead and looping around Haws Pasture would be designated and constructed. The project area will be closed to motorized travel unless designated open, except for snowmobiles which are accepted uses on snow. Snowmobiles are not permitted in big game winter range.

Map H in Appendix 3 illustrates the proposed vegetation treatments and travel management strategy for the Proposed Action.

2.3.3 ALTERNATIVE 1

Summary of Alternative 1

Veg. Type	**Sagebrush**	**Oak**	**Pinyon/ Juniper**	**Ponderosa Pine**	**Mixed conifer**
Action	Burn 200-250 acres, seed, cut scattered PJ to carry fire.	Burn 450-500 acres. Repeat 3-5 years if needed	Cut and burn 3000-3500 acres, reseed post burn	Burn 7000 acres. Repeat 3-5 years	Burn 300-350 acres. Repeat 3-5 years.
Veg. Type	**Aspen Burn**	**Aspen Maintenance**	**Aspen Regen. Harvest**	**Reseeding**	**Travel Management**
Action	Burn 1000 acres (prior cutting of conifer if needed) fence if needed.	Cut 1000 acres understory conifer.	No treatment	Emphasize native seed in restoring disturbed areas, non-native where necessary for erosion, and big game.	Closure per Appendix 3 Map I Reconstruct portions of Road Draw on same alignment, minimum standards, west of cattleguard.

This alternative was derived from significant issues identified by the Interdisciplinary Team (IDT)

during the scoping process. Among the public responses received, there were comments to eliminate timber harvest treatments and improve certain sections of Road Draw. Accordingly, Alternative 1 was created. Alternative 1 is identical to the Proposed Action except;

- timber harvest in the aspen will not occur
- aspen stand replacement fire will be increased to 1,000 acres to meet aspen regeneration objectives
- minor portions of Road Draw, west of the cattleguard will be reconstructed.

Map I in Appendix 3 illustrates the proposed vegetation treatments and travel management strategy for Alternative 1.

2.3.4 ALTERNATIVE 2

Summary of Alternative 2

Veg. Type	**Sagebrush**	**Oak**	**Pinyon/ Juniper**	**Ponderosa Pine**	**Mixed conifer**
Action	Burn 200-250 acres, seed, cut scattered PJ to carry fire.	Burn 450-500 acres. Repeat 3-5 years if needed	Burn 300-350 acres of which 38 acres may have cutting; reseed post burn	Burn 7000 acres. Repeat 3-5 years	Burn 300-350 acres. Repeat 3-5 years.
Veg. Type	**Aspen Burn**	**Aspen Maintenance**	**Aspen Regen. Harvest**	**Reseeding**	**Travel Management**
Action	Burn 830 acres (prior cutting of conifer if needed on 445 acres) fence if needed.	Cut 425 acres understory conifer.	Cut 166 acres as commercial $\leq$ 40 acres in size.	Native seed only in restoring disturbed areas	Closure per Appendix 3 Map J, close Road Draw, no OHV trail.

This alternative was derived from significant issues identified by the Interdisciplinary Team (IDT) during the scoping process. Among the public responses received, there were comments to eliminate mechanical treatments in identified roadless areas and motorized use in the north central portion of the project area, as well as utilize native seed only in restoring treatment areas. Accordingly, Alternative 2 was created. Alternative 2 is identical to the Proposed Action except;

- treat 300-350 acres of pinyon/juniper, of which 38 acres may have tree cutting
- treat approximately 830 acres of aspen with fire, of which 445 acres may cut conifer trees for fuel treatment
- treat 425 acres of aspen with removal of understory conifer trees
- regeneration harvest 166 acres of aspen
- utilize native seed only
- Travel management would entail closure of Road Draw to motorized travel and the elimination of the OHV loop trail.

Map J in Appendix 3 illustrates the proposed vegetation treatments and travel management strategy for Alternative 2.

2.3.5 ALTERNATIVE 3

Summary of Alternative 3

Veg. Type	Sagebrush	Oak	Pinyon/ Juniper	Ponderosa Pine	Mixed conifer
Action	Burn 200-250 acres, seed, cut scattered PJ to carry fire.	Burn 450-500 acres. Repeat 3-5 years if needed	Cut and burn 3000-3500 acres, reseed post burn	Burn 7000 acres. Repeat 3-5 years	Burn 300-350 acres. Repeat 3-5 years.
Veg. Type	**Aspen Burn**	**Aspen Maintenance**	**Aspen Regen. Harvest**	**Reseeding**	**Travel Management**
Action	Burn 800 acres (prior cutting of conifer, west of cattle guard, if needed) fence if needed.	Cut 650 acres understory conifer.	Cut 204 as commercial $\leq$ 40 acres in size.	Emphasize native seed in restoring disturbed areas, non-native where necessary for erosion, and big game.	Closure per Appendix 3 Map K, reconstruct portion of Road draw, seasonally close Road Draw from cattle guard to FR 166, and OHV trail from 8/20 to 6/1.

This alternative was derived from significant issues identified by the Interdisciplinary Team (IDT) during the scoping process. Among the public responses received, there were comments to preserve undeveloped areas located in the north central portion of the project area from further developments, improve several portions of the Road Draw road, and reduce vehicle access Accordingly, Alternative 3 was created. Alternative 3 is identical to the Proposed Action except;

- treat 800 acres of aspen with fire of which portions west of the allotment fence may use fuel treatment cutting
- treat 650 acres of aspen with understory conifer tree removal
- regeneration harvest 204 acres of aspen
- minor portion of Road Draw west of the cattleguard would be reconstructed
- Travel management would entail seasonal closure of Road Draw from the cattleguard east to FR 166, as well as seasonal closure of the OHV trail loop

Map K in Appendix 3 illustrates the proposed vegetation treatments and travel management strategy for Alternative 3.

2.3.6 COMPARISON TABLE OF ALTERNATIVES

The following table shows a comparison of the alternatives:

Vegetation Type	No Action	Proposed Action	Alternative 1	Alternative 2	Alternative 3
Sagebrush	Nothing	Burn 200-250 acres, seed, cut scattered PJ to carry fire.	Burn 200-250 acres, seed, cut scattered PJ to carry fire.	Burn 200-250 acres, seed, cut scattered PJ to carry fire. Except no cutting in IRA's, et al 83.	Burn 200-250 acres, seed, cut scattered PJ to carry fire.
Oak	Nothing	Burn 450-500 acres. Repeat 3-5 years if needed.	Burn 450-500 acres. Repeat 3-5 years if needed.	Burn 450-500 acres. Repeat 3-5 years if needed.	Burn 450-500 acres. Repeat 3-5 years if needed.
Pinyon/Juniper	Nothing	Cut and burn 3000-3500 acres, Cut PJ to carry fire/release understory sp.,reseed post burn	Cut and burn 3000-3500 acres, cut PJ to carry fire/release understory sp.,reseed post burn	Cut/burn 38 acres. No cutting in Roadless et al Burn only 262-312 acres. Total treatment of 300-350 acres.	Cut and burn 3000-3500 acres, precut PJ to carry fire/release understory sp., seed post burn
Ponderosa Pine	Nothing	Burn 7000 acres. Repeat 3-5 years	Burn 7000 acres. Repeat 3-5 years	Burn 7000 acres. Repeat 3-5 years	Burn 7000 acres. Repeat 3-5 years
Mixed conifer	Nothing	Burn 300-350 acres. Repeat 3-5 years.	Burn 300-350 acres. Repeat 3-5 years.	Burn 300-350 acres. Repeat 3-5 years.	Burn 300-350 acres. Repeat 3-5 years.
Aspen Burn	Nothing	Burn 700 acres (prior cutting of conifer if needed) fence if needed.	Burn 1000 Acres (prior cutting of conifer if needed) fence if needed.	Burn 830 Acres. Cut understory conifer outside undeveloped (445 acres)	Burn 800 Acres. Cut understory conifers west of allotment fence. Burn only east of fence.
Aspen Maintenance	Nothing	Cut 1000 acres understory conifer.	Cut 1000 acres understory conifer.	Cut in developed 425 acres. No cutting in undeveloped area northeast of Road Draw.	Cut 650 acres West of allotment Fence
Aspen Regeneration Harvest	Nothing	Cut 302 as commercial ≤ 40 acres in size.	No treatment on any acres.	No cutting in undeveloped area Northeast of Road Draw. Cut in developed 166 acres.	Cut 204 acres West of allotment fence and southwest of Road Draw outside undeveloped area.
Reseeding	Nothing	Emphasize native seed in restoring disturbed areas, non-native where necessary for erosion, and big game.	Emphasize native seed in restoring disturbed areas, non-native where necessary for erosion, and big game.	Native only	Emphasize native seed in restoring disturbed areas, non-native where necessary for erosion, and big game.
Roadless	Nothing	Cutting and burning in 83-84 inventory areas	Cutting and burning in 83-84 inventory areas	No cutting in IRA's 83-84.	Cutting and burning in 83-84 inventory areas
Wilderness	Nothing	No Treatment	No Treatment	No Treatment	No Treatment
Travel Management	Nothing	Closure per Map H, Appendix 3.	Closure as per Map I, includes reconstruct minor portions of Road Draw on same alignment, minimum standards, west of cattleguard.	Closure as per Map J includes close all of Road Draw and stem road going south. No OHV loop from new trailhead.	Closure as per Map K, includes seasonal closure Road Draw from cattle guard to FR 166 8/20 to 6/1. Reconstruct Road Draw Road wet portions as in Alt.1. No OHV loop during closure.

2.3.7 Purpose and Need Comparison Table

	Wildfire Risk Reduction	Big Game Winter Range Enhancement	Vegetation Structural Stage Development (PFC)	Travel Management
No Action	Large fire risk remains, predominately in the ponderosa pine type with a 98% chance of having one fire reach 1,000 acres in size. The estimated suppression cost over 40 years is $9 1/2 million (discounted)	No change in winter range forage for big game.	Large structural imbalances remain, primarily within the pinyon/juniper types, oak types and aspen types. Early seral vegetation conditions are limited across the landscape.	Area remains open unless designated closed. Past road management decisions do not change. Road Draw Road remaining open (RS2477 assertion).
Proposed Action	Large fire risk is substantially reduced across all fire groups. Burn intensity is also reduced	Increases, and enhances Big Game winter forage on 3000-3500 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 3000-3500 acres of pinyon/juniper into early seral. Moves 1002 acres of aspen into early seral by burning and harvesting. Moves 450-500 acres of oak into early seral.	Area is closed with designated open routes. A designated OHV trail is constructed. Road Draw Road remains open (RS2477 assertion).
Alternative 1	Large fire risk is substantially reduced across all fire groups. Burn intensity is also reduced.	Increases and enhances Big Game winter forage on 3000-3500 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 3000-3500 acres of pinyon/juniper into early seral. Moves 1000 acres of aspen into early seral by burning. Moves 450-500 acres of oak into early seral.	Area is closed with designated open routes. Road Draw Road reconstructed; Road Draw Road remains open (RS2477 assertion). A designated OHV trail is constructed.
Alternative 2	Large fire risk is reduced moderately throughout the fire groups. The risk persist on over 3,000 acres more than the Proposed Action.	Increases and enhances Big Game winter forage on 300-350 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 300-350 acres of pinyon/juniper into early seral. Moves 591 acres of aspen into early seral (burn and harvest). Moves 450-500 acres of oak into early seral.	Area is closed with designated open routes. Road Draw road closed to motorized travel (RS 2477 assertion). OHV trail is not designated or constructed.
Alternative 3	Large fire risk is substantially reduced across all fire groups. Burn intensity is also reduced.	Increases and enhances big Game winter forage on 3000-3500 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 3000-3500 acres of pinyon/juniper into early seral. Moves 859 acres of aspen into early seral (burn and harvest). Moves 450-500 acres of oak into early seral.	Area is closed with designated routes open. Road Draw Road is reconstructed with portions seasonally closed (RS2477 assertion). OHV trail is designated and constructed, and open form 6/1 to 8/20.

2.4 MITIGATION MEASURES/MANAGEMENT REQUIREMENTS FOR THE ACTION ALTERNATIVES:

Unless stated otherwise, the following mitigation measures were developed by the IDT for the action alternatives (See Specialist Reports, Project Analysis File). For the Pretty Tree Bench Vegetation Project, all mitigations would be implemented for all of the action alternatives. These mitigations are consistent with the LRMP standards and guidelines. The general discussion of SWCPs is found in Forest Service Handbook, FSH 2509.22 Soil and Water Conservation Practices Handbook, 1988. Specific SWCP's are found in the Project File.

Other recommended mitigations, in addition to the SWCPs, follow directly below. This list was developed by the Interdisciplinary Team and is common to both action alternatives, unless otherwise noted. Numbers in parentheses refer to Timber Sale Contract Provisions which are designed to implement the mitigations.

2.4.1 <u>WILDLIFE</u>

2.4.1.1 To assure no adverse effects to federally-listed threatened or endangered species or species proposed for listing, per Endangered Species Act of 1973, as amended:

a) Appropriate contract clause (C6.25) be applied for protection of any threatened or endangered species which might be discovered during any contractual implementation of projects.

b) At any period of project design, layout and implementation, if any threatened or endangered or proposed species is discovered and could be affected by the project, implementation would cease until the potential effect is removed or until consultation with the USDI-Fish and Wildlife Service is concluded.

Responsibility: Wildlife Biologist, Fire Management Officer, Prep Forester, and Sale Administrator.

2.4.1.2 To assure no adverse impacts to Forest Service listed Sensitive species, per Forest Service Manual (FSM) 2770.32:

a) If any sensitive species is discovered within a project area, implementation of the project shall cease until assessment is made of project's potential to adversely impact the species.

Responsibility: Wildlife Biologist, Prep Forester, Fire Management Officer.

2.4.1.3 To assure no adverse impacts to nesting goshawks (FSM 2670.32): Prior to prescribed burning within a one quarter mile radius of known goshawk nest sites, monitoring will be conducted to determined occupancy by goshawks. If sites are occupied, burning within those vicinities will be postponed until after the goshawk nesting season, postponed until nest sites are determined as non-productive, or postponed until an assessment is made on those portions within the nest vicinity, and treatment can proceed without adverse impact to fledging success of goshawks.

Responsibility: Wildlife Biologist and Fire Management Officer

2.4.1.4 To assure viable populations of species dependent on snags (tree cavities nesters) on those acres treated with timber removal, maintain a minimum of 20-30 snags per 10 acres (LRMP IV-25).

Recommended implementation:

a) In aspen units proposed for timber removal, snags and/or defective trees retained for cavity nesters shall be of 8 inches dbh or larger.

b) Snags and/or defective trees should be grouped or clumped and distributed randomly.

Responsibility: Wildlife Biologist, Prep Forester, and Sale Administrator.

2.4.1.5 To assure nutrient recycling and habitat for a diversity of organisms on units of aspen timber removal, retain logs which average not less than 33 linear feet per acre and not less than 12 inches diameter or greater, where feasible (LRMP IV-25).

Responsibility: Wildlife Biologist, Prep Forester, and Sale Administrator.

2.4.1.6 Provide for the protection of all active raptor nests found during management activities. Responsibility: Wildlife Biologist, Prep Forester, and Sale Administrator.

2.4.1.7 To assure a properly functioning ecosystem, artificial seeding of portions of the burn acres in pinyon-juniper and in sagebrush habitats shall emphasize native plant species, as provided by the Dixie National Forest Interim Guide.

Addition of non-native species shall conform to the criteria that non-native species be "non-intrusive". For this proposed project, 'non-intrusive' is further defined as non-aggressive in dominating a site at the detriment of excluding native species and do not have a tendency to spread off-site or colonize adjoining area.

Responsibility: Wildlife Biologist and Hydrologist

This mitigation does not pertain to Alternative 2. Alternative 2 uses native seed only.

2.4.2 SOIL AND WATER

2.4.2.1 Minimize soil compaction by:

a. Designated system of skid trails and landings spaced approximately 100 to 150 feet apart. The location of these trails should be planned to meet the needs of this entry as well as the specified road system (B6.422).

Responsibility: Hydrologist, Prep Forester, and Sale Administrator.

b. Restrict timber harvest operations (skidding and other activities that cause compaction) when soils are too moist. Generally, soils are too moist during and immediately following summer thunderstorms and in the spring following snow melt (B6.6).

Responsibility: Hydrologist, Prep Forester, and Sale Administrator.

c. Skidders will be restricted to skid trails and log endlined to the skidders unless the ground is sufficiently frozen or snow covered to prohibit soil compaction (C6.425#).

Responsibility: Hydrologist, Prep Forester, and Sale Administrator.

2.4.2.2 Leave ground fuel minimums of 5 to 7 tons/acre within ponderosa pine types and 10 to 15 tons/acre within mixed conifer types, where available. This will maintain soil productivity and meet goshawk recommendations.

Responsibility: Sale Administrator and Fire Management Officer

2.4.2.3 Fire and harvest treatments will not be permitted within 100' of riparian areas, adjacent to springs, perennial streams, waterbodies, and wetland soils (identified in Appendix 3, Map L and Map M, and project files

Responsibility: Fire Management Officer, Hydrologist, and Prep Forester

2.4.2.4 In site 147-8, a one hundred (100) foot no treatment buffer will be established around all gullies.

Responsibility: Fire Management Officer and Hydrologist.

2.4.3 VISUALS AND RECREATION FACILITIES

2.4.3.1 Within one hundred and fifty (150) feet of Concern Level One roads and trails (FR 153 and the Great Western Trail) stumps will be flush cut with the ground level and 100 percent of all slash greater than one inch in diameter would be disposed.

Responsibility: Prep Forester, Sale Administrator, and Landscape Architect.

2.4.3.2 Adjacent to Concern Level One roads and trails management activities would affect a maximum of 20 percent of the linear length of the road or trail.

Responsibility: Prep Forester, Sale Administrator and Landscape Architect.

2.4.3.3 Within one hundred and fifty (150) feet of Concern Level Two roads and trails (FR 566 and the Road Draw Road) stumps will be cut to within six (6) inches of ground level and 100 percent of all slash greater than one inch in diameter would be disposed.

Responsibility: Prep Forester, Sale Administrator, and Landscape Architect.

2.4.3.4 Adjacent to Concern Level One and Two roads and trails locate skid trails in a curvilinear fashion to restrict the view down the skid trail corridors (B6.422).

Responsibility: Landscape Architect, Sale Prep Forester, and Sale Administrator.

2.4.4 PRESCRIBED BURNING ACTIVITIES

2.4.4.1 The Forest Service will comply with guidelines and procedures listed within the Utah smoke Management Plan (7/20/99).

Responsibility: Fire Management Officer.

2.4.4.2 Provide for structure protection at the lower Garkane hydroelectric power plant as needed when burning within 1/4 mile.

Responsibility: Fire Management Officer.

2.4.5 CULTURAL RESOURCES

2.4.5.1 If any cultural resources are discovered during project activities, work in that area will cease until the discovery can be examined by a professional archaeologist (C6.24#).

Responsibility: Prep Forester, Sale Administrator, and Forest Archeologist.

2.4.5.2 In order to prevent ground disturbance in the Pinyon/Juniper burns, no motorized vehicles would be allowed except pre-authorized OHV's, during implementation.

Responsibility: Forest Archeologist and Fire Management Officer.

2.4.5.3 The historic wooden flume southwest of McGath Lake will be protected from prescribed fire treatment activities.

Responsibility: Forest Archeologist and Fire Management Officer.

2.4.6 SAFETY REQUIREMENTS

2.4.6.1 Post signs warning Forest users of logging truck activity. One sign would be positioned at the Forest boundary at the entrance to Salt Gulch on Forest Road # 153. An additional sign will be placed above (north of) the private land in the Salt Gulch area. A sign will also be placed at the junction of Forest Road # 153 and 163.

Responsibility: Prep Forester and Sale Administrator.

2.4.6.2 Hauling of logs would be prohibited on Forest Roads during the weekends from Memorial day through Labor day and on the specific holidays of July 4th and July 24th.

Responsibility: Prep Forester and Sale Administrator.

2.4.6.3 Signing will also be required during any controlled burning operations to warn Forest users of the presence of possible smoke on the roads and additional traffic. One sign will be posted at the entrance to the forest on Forest Road # 153 on the Salt Gulch side. Another sign will be placed at least 1 mile on the opposite side of the burn on Forest Road # 153. Additional signs will be placed at the entrance of any side road which burning would be occurring on.

Responsibility: Fire Management Officer.

2.4.7 LIVESTOCK GRAZING

2.4.7.1 Following seeding and burn treatments, the grazing rotation or livestock within, the Sand Creek Allotment will be modified in the Annual Operating Plan to provide a minimum rest of one growing season after treatment.

2.4.7.2 Structural range improvements will be protected during implementation of timber harvest and prescribed fire treatments.

Responsibility: Sale Prep Forester, Sale Administrator, Fire Management Officer

2.4.7.3 Every effort will be made to ensure that all seed mixtures used on the project area is free of noxious weed seeds (FSM 2080.03 Sec. 2).

Responsibility: Wildlife Biologist, Sale Preparation forester and Fire Management Officer

2.4.8 ROADLESS/UNDEVELOPED

Within areas mapped as roadless or undeveloped:

2.4.8.1 Aspen regeneration clearcuts will be layed out with irregular, feathered edges. There shall be a minimum of 10 leave trees per acre, some in clumps and some as individuals. Stumps will be cut flush with the ground.

Responsibility: Prep Forester, Sale Administrator and Landscape Architect.

2.4.8.2 In sagebrush and pinyon-juniper burn areas, pinyon and juniper trees stumps will be cut flush with the ground.

Responsibility: Prep Forester, Sale Administrator and Landscape Architect.

2.4.8.3 In aspen burn treatment areas, conifer stumps will be cut flush with the ground.

Responsibility: Prep Forester, Sale Administrator and Landscape Architect.

2.5 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The preferred alternative is the Proposed Action.

CHAPTER 3

AFFECTED ENVIRONMENT

3.1 VEGETATION

3.1.1 FOREST ECOSYSTEMS

3.1.1.1 ECOSYSTEMS

This section describes the major vegetation ecosystems delineated during the NFMA analysis (this information can be found in the Pretty Tree Bench Project File) and as described in the LRMP (Chapter II-17-18) found within the analysis area. Further information can be found in the Pretty Tree Bench Vegetation Project folder.

Table 3.1.1.1 summarizes the land types found within the project area. Acres are based on GIS delineation at the stand level using aerial photo interpretation, ground survey, or RMRS database calculations:

Table 3.1.1.1: Land Type

Land Type	Acres
Rock	885
Grassland	733
Sagebrush	1542
Pinyon pine/Utah juniper (PJ)	15062
Gambel Oak	1861
Mountain Mahogany	141
Water	9
Ponderosa pine	7495
Aspen	3366
Mixed conifer	1138
Engelmann spruce/subalpine fir	536
Private	1161
Total	33929

Rock = sites dominated by rock outcrops with less than 10% tree cover
Grassland = either a wet meadow (herbaceous vegetation and abundant moisture) or mountain grassland (grass covered opening within a continuous coniferous forest)
Sagebrush = non-forested opening dominated by mountain big sagebrush (Artemesia tridentata var. vaseyana) and black sagebrush (Artemisia nova)
PJ= Stands dominated with pinyon pine (Pinus edulis) and Utah juniper (Juniperus osteosperma)

Gambel oak= Stands dominated with gambel oak brush (Quercus gambelii)
Mountain mahogany = non-forested opening dominated by birch leaf mahogany (Cercocarpus montanus)
Water = presence of surface water throughout most of the year
Ponderosa pine= Stands within the ponderosa pine (Pinus ponderosa) habitat types.
Mixed Conifer = Conifer stands within the Douglas-fir (Pseudotsuga menziesii) or subalpine fir (Abies lasiocarpa) habitat types. This type is composed of the Douglas-fir and white fir (Abies concolor) cover types.
Engelmann spruce (Picea Englelmannii)/subalpine fir = conifer stands within subalpine fir series
Private = ownership

Analysis of the vegetation found within the Pretty Tree Bench analysis area was developed using an ecological approach. An assessment of these vegetation communities included five scales: Regional, Sub-Regional, Sub-Section, landscape (project) and stand. The Regional (Intermountain Region) and Sub-Regional (Utah High Plateaus and Mountain Section) scales were analyzed and documented in the (Draft Properly Functioning Condition, Process --(12/23/96) -- Draft), and completed by interdisciplinary teams. A Subsection (Aquarius Plateau/Boulder Top and Barney Top/Table Cliffs) and project level analysis were completed at the district level. Properly functioning conditions were developed at the regional level based on past historical conditions. The assumption being that if the various vegetation systems and their processes are similar today as those occurring historically; then conditions approximate those under which present species evolved, and thus will persist. An assessment at each level was described based on existing conditions in light of the properly functioning conditions by four criteria: structure, composition, processes, and patterns. In addition, various data was collected using the best available information to describe conditions at the stand level.

The following descriptions are based on field reconnaissance, stand exam, RMRS data, aerial phot interpretation, and past analysis. The Pretty Tree Bench project area contains a diverse array of vegetation types as listed above. The project area, dominated by a south aspect, contains bands of vegetation types correlated to elevation i.e., sagebrush, PJ, ponderosa pine, aspen, mixed conifer, and then spruce/fir. Within these bands, are smaller parcels of differing vegetation caused by past fire disturbance (meadows within ponderosa pine), changes in aspect (mixed conifer on a north slope in the aspen), and water (aspen clones within the ponderosa pine). These patches are important in providing ecosystem diversity to the landscape.

The **mountain grasslands** (733 acres) are scattered across the project area in 36 separate parcels, but are predominantly found within the aspen belt. The occurrence of frequent fire has been largely eliminated due to both grazing and fire suppression activities. These activities have resulted in reduced ground fuel continuity and levels creating conditions which are difficult to burn. Under historical conditions, fire disturbance patterns (Draft Properly Functioning Condition, Process -- 12/23/96) were patchy, creating a mosaic of structural age classes. Many areas now exceed 20% soil exposure. The range of grassland has been reduced by encroachment from sagebrush, aspen, and conifer trees due to the loss of frequent fire and reduced competition from ground vegetation. These changes can be seen by comparing historical aerial photos, such as 28U-174 taken in 1948 to 1190-173 taken in 1991.

As described in the PFC Sub-Section assessment (Draft Proper Functioning Condition (PFC) Assessment for Major Vegetation Types on the Aquarius Plateau/Boulder Top and Barney Top/Table Cliffs Subsection), this type is outside of a balanced range of structural classes and is not functioning properly. Historical ranges have been reduced.

The **sagebrush type** (1,542 acres), is generally located in the lower portions of the project area, both below and within the PJ zone. The sagebrush stands are dominated by mature plants (reconnaissance notes for sites 147-8 and 144-4 and 6), generally exceed 15% in sagebrush cover, and contain areas exceeding 20% bare ground. Evidence of recent fire within this type was not witnessed. Comparison of aerial photos taken in 1960 and 1991 (stands 144-4 and 149-3) show that the range has decreased due to encroachment by pinyon pine and juniper.

Historical disturbance from fire (Draft Properly Functioning Condition, Process --12/23/96) would have maintained a mosaic of age classes and sagebrush canopy cover as related to burn patterns and thinned out young PJ establishing in the openings (Bradley, Noste, and Fischer, 1992, pg 38-42). Reduced sagebrush canopy cover would have allowed for greater grass and forbs than found today. The PFC Sub-Section assessment describes this type as outside of a balanced structural stage, loss of range due to conifer encroachment, and high risk to soil loss and productivity.

The **pinyon-juniper**, PJ (15,062 acres), occurs in an elevation zone, from 6,700 feet to 8,200 feet above sea level, located above the sagebrush and below the ponderosa pine zones. Existing stand conditions are best described as relatively heavy canopy cover, mature, 2-3 age classes, with very little understory vegetation. Throughout the PJ belt, analysis of aerial photos (comparison of photos 3-140 of 1960 with 1190-141 of 1991 for the King Bench area) and reconnaissance indicates stands are homogenous with decreasing diversity between stands. While there is evidence of past fire disturbances such as in 147-5 there lacks any recent disturbances creating new openings or reductions in stand densities. Past fires would have created a mosaic of stands with varying age classes and sizes (Bradley, Noste, Fischer, 1992, Draft Properly Functioning Condition, Process --12/23/96) and savannah like densities (Gottfried 1996) in those stands conducive to fire. Within the stands themselves, past frequent, low severity fires would have left scattered individuals of trees, killing most of the regeneration which is more susceptible to fire (Bradley, Noste, Fischer, 1992) with oak, bitterbrush, and sagebrush mixed in between tree crowns forming a savannah like stand (Leopold, 1924, Gottfried, 1993 and 1996). Loss of fire as a disturbance agent has generally been attributed to past livestock grazing which reduced understory fuels and fire suppression (Ernst and Pieper, 1996, Tausch and West, 1995, Gottfried, 1996, Gottfried, 1993, Pelt and Johnson, 1993) as well as fire suppression and loss of aboriginal burning. Present conditions are different and can be seen by comparing historical photos (DIC-2K-19 of 1952 and 1190-166 of 1991) with current conditions. Tree canopy cover has increased and small openings have either decreased in size or disappeared altogether. The above mentioned brush species are still present, but at a reduced level due to the increasing competition from the trees (Gottfried, 1996). Grass and forbs are largely missing. Evidence of past understory vegetation (reconnaissance notes 147-5) is indicated by the dead shrubs underneath the younger PJ. The oldest age class is about 200-250 years old. Exceptions to this description are stands which for various reasons would have been incapable of sustaining frequent fires and are lacking in a grass/forb/shrub layer. These stands are generally found in the lowest elevations near the Salt Gulch area (reconnaissance notes 147-4) and would have changed very little (Gottfried 1996). Because pinyon pine will dominate Utah juniper overtime, most stands in the area have a greater percentage of pinyon in the different age classes (60%). The driest sites form an exception where the more drought tolerant juniper has a competitive advantage. Past harvest activities include utilization of the juniper along the main roads for fence posts and fuelwood. Pinyon-juniper range has increased, occupying areas previously dominated by sagebrush.

The PFC Sub-Section assessment has identified this type at high risk, because of accelerated soil loss from reduced ground cover. Unbalanced structural diversity, composition and pattern in the frequent fire dependent PJ stands (estimated at up to 10,419 acres in the project area) indicate an improperly functioning condition.

The next zone, **oak** (1,861 acres), occurs from approximately 7,200 feet to 9,100 feet above sea level. Typically the oak stands occupy south facing slopes and are brush-like in form, very thick, with scattered ponderosa pine throughout. Oak can also be found within stands of conifer trees, often dominating ground vegetation. Within these stands, there is no evidence of recent stand replacement fire which would create younger stands of oak. Therefore, most stands of oak are in the mid to late age class structure due to lack of recent fire disturbance. Because of adjacent seed sources from the conifer stands, conifer trees appear to be increasing within these stands of oak. An exception to these conditions is the 70 acres of prescribed fire treatments completed in 1996-7, creating a early seral age class and reduced invasion from ponderosa pine.

Past fire activity would have maintained existing clones of oak which re-sprout upon burning, removing any conifers, and limiting the spread of oak along the clonal edge. Studies in the West have shown increases in the size and number of oak clones comparing past and current photos (Clary and Tiedeman, 1993), most likely as a result of interrupted fire activity. Additionally, lack of fire has allowed invasion of conifers (Harper, Wagstaff, and Kunzler) and spread of clones to the outlying stands (Madany and West, 1983). These changes can be seen by comparing historical aerial photos (28U-174 of 1948 and 1190-173 of 1991) for stand 33-37. The PFC Sub-Section asscssment describes this zone at low risk, near properly functioning condition, with structural balance and encroachment from conifers somewhat out of balance.

The **mountain mahogany** zone (141 acres) is located on an east facing slope above Boulder Creek at approximately 8,000 feet above sea level. About 96 acres are in the mid to late seral age class due to lack of recent fire disturbance, increasing ponderosa pine, pinyon pine, and juniper, and have poorly developed understory vegetation due to overstory competition. 45 acres are in the early seral stage due to a stand replacement fire in 1994. Mountain mahogany range has decreased due to encroachment by conifer species. These changes can be seen by comparison of historical aerial photos (DIC-1K-93 of 1952 with 1190-176 of 1991) within stand 44-44.

Within the mountain mahogany historical fire return intervals (Draft Properly Functioning Condition, Process --12/23/96) of 50 to 70 years of mixed fire severity would have maintained a mosaic of structural stages and reduced encroachment from adjacent conifer trees. Although the PFC Sub-Section assessment has identified this type at low to moderate risk due to lack of stand replacement disturbance, impacts from the 1994 fire place this zone in properly functioning condition.

The **ponderosa pine** (7,495 acres), occurs from 7,700 feet to 9,100 feet above sea level and is located between the PJ and aspen zones. The ponderosa pine/gamble oak (PIPO/QUGA) habitat type predominates with ponderosa pine as the climax species. Past fire disturbance would have been a frequent, low intensity regime (Bradley, Noste, and Fischer, 1992, Draft Properly Functioning Condition, Process --12/23/96). Stand conditions would have been fairly open, composed of all ages in even-aged clumps, with low fuels and brush (Madany, 1983, Stein, 1988, Covington and Moore, 1994). With fire exclusion and grazing, stand conditions evolved towards higher tree densities particularly in the sapling to immature sawtimber sizes, increased fuel loading from accumulation of needle litter and logs, as well as increased oak brush. The net result of these changes were stand conditions became unsustainable, not capable of maintaining existing stand densities, especially to the oldest age classes. As a result, a pine beetle epidemic occurred in the early 1980's throughout the district pine belt, estimated at the time to have the potential to eliminate up to 80 percent of the sawtimber sized pine (Escalante Timber Harvest and Bark Beetle Control Program, 1981). Some of

these changes can be seen by comparing historical aerial photos (22U-179 of 1948 with 1190-98 of 1991) of stand 30-1.

An accelerated timber harvest program was initiated to reduce the mortality of the pine, greatest in the oldest age classes. Harvest practices largely removed the oldest age classes which were most susceptible to beetle infestation, and reduced overall stand densities to 40-60 basal area/acre, featuring the 60 to 80 year old sawtimber. These activities occurred on approximately 6,541 acres or 87 percent of the pine found within the analysis area. The impact of these treatments was the creation of a much more even-aged zone of pine with lower densities and increased tree health. Pine stands with healthy oak brush that were thinned to reduce pine densities ended up increasing the presence of oak which sprouted into the openings. Ponderosa pine range has increased into the oak and aspen type and has been lost to the mixed conifer. Seral aspen clones can be found within the pine, occupying cooler microsites. These stands are generally mature and succeeding to ponderosa pine.

The unharvested pine is uneven-aged with even-aged clumps, dominated by the immature to mature age classes, dense, and generally occurs in difficult to access locations.

The PFC Sub-Section assessment identifies this zone at moderate to high risk: due to increased risk from catastrophic fire, vegetation patterns outside the historical range, and specific to the project area, decreased structural diversity.

The next zone, **aspen** (3,366 acres) is limited to south or east facing aspects from 7,900 feet to 9,400 feet above sea level with small clones located along riparian areas and northern aspects within the pine zone. Most stands seem to have been established in the late 1800's. Present conditions within seral clones (1,504 acres) are depicted by mature (Frykman) aspen overstories with heavy conifer (ponderosa pine, Douglas-fir, and subalpine fir) advanced regeneration. Aspen stands are classified by community types. The bitterbrush/subalpine fir (PUTR-ABLA) community dominates the zone, with subalpine fir being the climax species. Aspen suckering is very limited due to the conifer (Perala 1991) presence and decline of clone vigor. Densities of understory vegetation is still high in openings on sites lacking in conifers. Most of the aspen is decadent with maturity, root and stem decays. Aspen stands in the pine belt are also mature with pine and Douglas-fir regenerating underneath. Stable or climax stands of aspen (1,862 acres) occupying the upper portions of the zone, are generally mature, decadent, with varying degrees of aspen regeneration. Overall, most of the clones show the ability to regenerate given sufficient disturbance, but presently have inadequate aspen regeneration necessary to replace the aging (Schier and Smith, 1979) overstory. Browsing pressure on aspen seedlings appears to be low to moderate. Aspen riparian zones are losing the deciduous component (aspen, birch) to conifers.

The past frequent fire regime would have maintained these sites as predominantly even-aged seral aspen with little invasion of conifers. Some stands would have been converted back to the grass forb stage. Most stands would have been in immature aspen with scattered grass/forb openings (Jones and DeByle, 1985, Debyle et al, 1987, Bradley, Noste, and Fischer, 1992). Conifers would have been limited to unburned sites, usually rock patches, cool, north aspects, or wet areas. The PFC Sub-Section Assessment indicates stable aspen at low risk focusing on mature stands with inadequate regeneration and seral aspen at higher risk due to loss in range from conifer trees. Some of these changes can be seen by comparison of historical aerial photos (28U-174 of 1948 with 1190-173 of 1991) for stand 30-1.

The next zone, **mixed conifer** (1,138 acres), occurs in the same elevation belt (7,500 to 9,700 feet above sea level) as the aspen but occupies the cooler aspects. Subalpine fir (Abies lasiocarpa) or

white fir (Abies concolor) are the climax species with ponderosa pine, Douglas-fir, Engelmann spruce (Picea engelmanii), and aspen as the seral species depending on site conditions. The predominant habitat type is subalpine fir/oregon grape (ABLA/BERE). Approximately 332 acres or 29% of this type has been previously harvested. Existing conditions are even-aged stands, featuring 60-80 year old ponderosa pine and Douglas-fir at low density levels with small interior openings created from salvage of dwarf mistletoe infection areas, and increasing presence of pine/Douglas-fir seedlings. Within the untreated stands (806 acres), present conditions have density levels greater than 160 basal area, multi-storied canopies having an overstory of up to (30"+DBH) Douglas-fir and mature aspen with an overstocked understory of primarily subalpine fir. There is some Douglas-fir and Engelmann spruce in the upper elevations, or a mature ponderosa pine/Douglas-fir overstory, and an overstocked understory of white fir and some Douglas-fir in the lower elevations. Most areas have widespread dwarf mistletoe infection in either the Douglas-fir or ponderosa pine trees. Overall, range has increased at the expense of the aspen and ponderosa pine type.

Past fire disturbances were typically frequent, and of low intensity fires (Bradley, Noste, and Fischer, 1992) probably as a result of fires continuing to burn upslope from the pine belt. This regime would have maintained stands with fire resistant seral species, namely Douglas-fir and ponderosa pine and promoted the regeneration of aspen (1973). Evidence of this can be seen from the fire scarring on many of the overmature Douglas-fir, the age of the mature aspen, as well as comparison of historical aerial photos (GS-QH-8-101 of 1951 with 1190-171 of 1991) for stands 33-19,20, and 22. The PFC Sub-Section assessment has identified this zone as moderate to high risk to stand replacement fire, range outside of historical patterns, and loss of seral species.

The **spruce/fir** type (536 acres) occurs at the highest elevations, from 9,400 to 10,000 feet above sea level, located above the aspen and mixed conifer zone. Associated species include Douglas-fir, aspen, limber pine, and blue spruce. Density levels exceed 150 square feet of basal area/acre; structure is multi-storied, with increasing subalpine fir in the understory. Due to past spruce mortality, an older mature age class is lacking, and ground fuel loading is high. Aspen clones are mature with heavy understory conifer presence. Overall, stand composition has become more homogenous with increased dominance of true fir, and loss of both aspen clones and more open stand conditions favorable to spruce and Douglas-fir regeneration. Spruce/fir range has increased into meadows, riparian areas, and aspen clones.

Historical stand conditions would have been influenced by a mixed severity fire regime of 50-80 years (Draft Properly Functioning Condition, Process --12/23/96) maintaining aspen clones and open conifer stand conditions with a 100-300 year lethal fire regime moving conditions back to early seral. The PFC Sub-Section assessment places this lower elevation spruce/fir zone at risk due to loss of the aspen component with continued loss of fire disturbance. Specific to this project area would be loss of structural and composition diversity from increased stand densities and conditions favorable to subalpine fir dominance.

Ecosystem Health

This section describes the forest health from an ecosystem perspective.

Kolb et al. (1994) considers four characteristics for a healthy ecosystem:

- the physical environment, biotic resources, and trophic networks to support productive forests during at least some seral stages;
- resistance to catastrophic change and/or the ability to recover from catastrophic change at

the landscape level;

- a functional equilibrium between supply and demand of essential resources (water, nutrients, light, growing space) for major portions of the vegetation; and
- a diversity of seral stages and stand structures that provide habitat for many native species and all essential ecosystem processes.

Application of these attributes implies that presence of insect, disease, and tree mortality does not necessarily indicate an unhealthy ecosystem as long as the rate of mortality was not greater than the capacity for replacement.

However, because of the increasing stand densities, forest floor litter accumulations, conversion of aspen to conifer, conversion of open, seral stands to dense, shade tolerant species, and tree mortality throughout the watershed, the destructive potential of wildfire eliminating the forest cover at a landscape scale has substantially increased. Additionally, these factors have also created an imbalance between demand and supply of water, nutrients and growing space for major portions of the vegetation (Covington and Sackett, 1986), especially herbaceous vegetation (Covington and Moore, 1994). Such elements as nutrient cycling can be reduced due to lack of fire and compensation factors such as microbial decompensation which results in large nutrient reserves in the forest floor in a form unavailable to plants (Covington and Sackett, 1990). Although past harvesting has moderated some of these factors, emphasis on even-aged management has reduced the diversity of stand succession stages (particularly the early and late) and structure.

3.1.2 STAND HEALTH

This section describes the analysis area in terms of stand health as described in the LRMP (Chapter IV-7-8 Goals 24, 25B, 27, IV-21, IV-65, IV-70, IV-77, IV-114-116, IV-121, and IV-139)

Within the PJ belt, very little insect and disease activity was seen. Some dwarf mistletoe patches in the juniper were found, but at levels which appear to be endemic and stable. During the mid 1990's drought cycle, mortality of pinyon pine increased in the Salt Gulch area from Ipps beetle, but has since decreased to minimal levels.

Dwarf mistletoe is the primary disease within the pine belt. The mistletoe occurs in a belt approximately 7,800 feet above sea level cutting through the Black Lake, Ditch, Little Ditch, Side Hollow and Bear Creek sale areas. The level of infection is moderate to high (Forest Pest Management Evaluation), with some tree mortality and infected regeneration. This area is adjacent to and within the Douglas-fir portion of the mixed conifer belt which also has heavy levels of dwarf mistletoe. Other patches do occur throughout the pine belt but are less than 2-3 acres in size. The result of these infections are reduced stand densities, loss of large trees, and elimination of ponderosa pine and Douglas-fir regeneration.

Beetle activity is endemic, occurring largely in scattered trees/clumps within those stands not having been harvested in the past. Most "hit" trees are the overmature "pumpkins" which are highly susceptible to attack due to age and competition from the younger trees underneath. The younger age classes are not being hit.

Aspen clones throughout the project area have generally attained maturity and contain various stem and root decays including false tinder fungus, white trunk rot, sooty bark canker, Cytospora and

black canker.

3.1.3 PRODUCTIVITY

This section describes the relationship of the ponderosa pine, aspen, mixed conifer, and spruce/fir vegetation types in terms of stand growth rates and site potentials for timber production.

Within the ponderosa pine belt, PIPO/QUGA represents the dominant habitat type. Timber potentials for this type are relatively high for the pine series, with most sites capable of full stocking (Youngblood and Mauk, 1985). Current stand densities, which effect stand growth rates are greatly different if the stands had been harvested in the 1980's. Previously harvested stands are at 15 - 25 percent of maximum stand density (SDI) (Long, 1985) which indicates optimum tree growth (individual tree diameter growth shows 1.4-1.6 inches per decade) and moderate stand growth. Unharvested stands are at 40 - 55 percent of maximum SDI, where individual tree growth is low, with decreasing crowns, stand growth is maximized, with stand conditions approaching the point of density related (Long, 1985) mortality.

For the aspen types, most of the stands were delineated into quaking aspen, Douglas-fir/common juniper (POTR-PSME/JUCO) in the lower elevation and quaking aspen, subalpine fir/mountain snowberry/ross sedge (POTR-ABLA/SYOR/CARO) in the upper elevations. Tree productivity is estimated from low to moderate for these community types (Mueggler and Campbell, 1986). Densities are estimated at 45 to 55 percent of maximum SDI whereby densities are high enough to initiate density related mortality (Long, '1985). Maturity of the trees has also reduced tree growth and allowed for loss of fiber due to stem and root diseases.

ABLA/BERE is the most prevalent habitat type in both the mixed conifer and spruce/fir types and represents moderate timber potential (Youngblood and Mauk, 1985). Stand densities are generally quite high, averaging 40 to 55 percent of maximum SDI and indicates stand conditions as described under the unharvested pine zone. Mortality of the larger Douglas-fir and Engelmann spruce create understocked areas.

3.1.4 VEGETATIVE STRUCTURAL STAGE DISTRIBUTION

This section describes the ponderosa pine, aspen, and mixed conifer, spruce/fir vegetation types in terms of managing for a variety of seral stages and stand structures.

The project area was evaluated based on stand conditions, including structural stages (VSS), on composition, and structure developed within, by Reynolds (1992). These recommendations use a landscape ecosystem approach by providing for a matrix of different structural stages, over large landscape units, along with consideration of how the patches relate to one another. Mimicking the natural disturbance not only compliments the natural disturbance regime of the forest, but provides for a continuous flow of structural stages over time. These criteria also correlate to those elements described for a properly functioning condition in the Draft Properly Functioning Condition, Process - -12/23/96 document. Such forest ecosystem elements as productive soils, forest productivity and health, eugenics, woody debris, large snags, downed logs, microorganisms, invertebrates, and vertebrates are provided for (Reynolds et al, 1992). Thereby biodiversity can be maintained or improved.

The project area was delineated into three separate nesting home ranges, referred to as Sand Creek McGath, and Side Hollow. The foraging area is common. Each stand was identified as to a particular nesting (NA), post fledgling (PFA), or foraging area (FA). Using stand exam or reconnaissance data,

each plot was analyzed for the VSS classes and canopy cover (Reynolds et al, 1992) within Sand Creek and McGath Lake (LBS VEGETATION TREATMENT PROJECT EA, Chapter III, pages 6-8) and then summarized as a stand. Since most of the LBS Vegetation project area overlaps into this analysis area, these figures will be used. Description of the Side Hollow area is based on aerial photo interpretation and ground surveillance.

Table 3.1.4 VSS Distribution - for suitable habitat (spruce/fir, mixed conifer, ponderosa pine, and aspen)

VSS Class

Management Area	1	2	3	4	5	6
McGath NA ac	16	31	64	40	12	11
%	9	18	37	23	7	6
McGath PFA ac	36	77	149	100	59	32
%	8	17	33	22	13	7
Sand Ck. NA ac	19	0	64	87	0	20
%	10	0	34	45	0	11
Sand CK PFA ac	45	14	190	91	109	4
%	10	3	42	20	24	1
FA ac	746	653	2799	2893	1587	653
%	8	7	30	31	17	7

The desired VSS distribution for nesting, post fledgling, and foraging areas are 0-0-0-0-100-100; 10-10-20-20-20-20; and 10-10-20-20-20-20 percent respectively. The nest areas are lacking in the VSS 5 and 6 classes. The PFA and FA areas are generally lacking in the VSS 1, 2, 5, and 6. Within the mixed conifer belt, much of the VSS 1 and 2's are composed of subalpine fir which will not be capable of attaining the sizes that Douglas-fir, ponderosa pine, and Engelmann spruce can.

Since neither NA has been harvested, densities (40-50% of maximum SDI) and canopy cover (>60%) are high. The McGath PFA is similar to the NA. The Sand Creek PFA has had most of the 462 acres harvested, resulting in lower densities (26% max. SDI) and canopy cover (<60%). Within the FA, densities are 15-25% of max. SDI in harvested areas (2,350 acres), naturally open stands (974 acres), and 40-55% of max. SDI in unharvested areas (6,007 acres).

Side Hollow NA

This NA consists of non-harvested ponderosa pine and aspen riparian stringers. Pine stands are uneven-aged, dominated by VSS 4-6 classes, with canopy cover exceeding 60%. Aspen stands contain large diameter ponderosa pine, mid to late seral aspen, with variable regeneration.

Side Hollow PFA

This PFA consists of previously harvested ponderosa pine stands and both seral and stable aspen stands. Pine stands are generally even-aged, dominated in the VSS 2-4 classes, with canopy cover less than 60%. Aspen stands consist of mid to late seral age class (VSS 2-4), canopy cover greater than 60%, with increasing conifer in seral clones.

Side Hollow FA

The foraging area in this area is very similar to the McGath Lake and Sand Creek areas. VSS classes would then be 8-7-30-31-17-7 present. Deficient VSS 6 would be as a result from past harvest and beetle activity, along with a surplus in the mid size classes due to past even-aged management. Stands would be open with excellent tree growth sufficient to carry trees into the VSS 5 and 6 classes. Openings are favorable to seral species natural regeneration. Snag distribution would be lacking in treated stands. Although most aspen stands have attained maturity, due to their smaller diameter aspen trees would be classified as VSS 2-4.

3.1.5 FOREST LAND SUITABILITY

Forest Land Suitability - Using direction provided in the LRMP (IV-37 and V-7), each stand was rated for suitability for timber management. The following table shows the suitability for the project area:

Table 3.1.5: Forest Land Suitability

Suitability Class	Acres
Suitable Forest Land	10,713
Cannot be adequately restocked	286
Irreversible resource damage	167 *
Non-timber species	15,348
Developed for non-forest use	0
Non-forest	2,625
Economically or technologically unsuitable	1,137
Administratively withdrawn	2,508
Private Land	1,145
Total	33,929

* These are potential acres of irreversible damage to the soil resources should timber harvest activities occur.

3.1.6 OLD GROWTH

This section describes the vegetation types relative to old growth habitat as required in LRMP, Chapter IV, page 35.

Each forested stand within the project area was rated regarding old growth habitat as described in the Characteristics of Old-Growth Forests in the Intermountain Region publication (Hamilton et al, 1993) using RMRS data, field reconnaissance, stand exam data, past analysis, and aerial photo interpretation (Lowry, 1992). The following attributes were considered:

- size and age of main canopy
- variation in tree diameter classes
- tree decadence
- tree canopy layers
- number and size of snags
- number and size of down and woody

The Pretty Tree Bench project area was delineated into old growth on a stand by stand basis. Table 3.1.6 summarizes the findings.

Table 3.1.6 Old Growth

Forest Type	Total acres	Old Growth acres	% Old Growth
spruce/fir	536	0	0
mixed conifer	1,138	135	12
ponderosa pine	7,495	512	7
pinyon/juniper	15,062	6,322	42
aspen	3,366	1,409	42
non-forest	6,332	0	0
Total	33,929	8,378	25

Within the project area of 33,929 acres, there are 8,378 acres of old growth, or 25 percent of the project area. Exclusion of the non-forested acres within the project area which cannot contribute to old growth would result in 8,378 acres within 27,597 acres, or 30 percent.

Because of the relative young age of the spruce/fir stands due to the past spruce beetle epidemic, old growth habitat was not present. This area represents the transition from the spruce/fir to the cold and dry interior Douglas-fir type. For most stands, the missing element is either number of trees greater than 15.0" DBH, or 150 year minimum age of the main canopy. Most spruce/fir stands, given thirty to fifty years, will attain these old growth habitat requirements.

12% of the mixed conifer type is composed of old growth due to lack of a major natural disturbance and/or harvesting. These stands have sufficient overmature Douglas-fir remaining in the overstory, providing both snags and decadent large diameter trees to qualify. The heavy understory is predominantly immature subalpine fir.

The ponderosa pine zone has seven percent old growth, mainly in unharvested stands where sufficient large, mature trees survived the 1980 beetle epidemic. These stands are generally uneven-aged with a heavy understory of pine sapling-sawtimber sized trees underneath.

Approximately 42% of the PJ qualifies as old growth. Lack of recent disturbance has allowed stand conditions to progress to this point, having sufficient old mature trees.

Forty-two percent of the aspen stands qualify as old growth. These stands represent stable or climax stands with less than 10% conifer trees, capable of attaining the 12.0 inches in diameter to qualify.

3.2 RECREATION

3.2.1 SETTING

The 33,929 acre Pretty Tree Bench analysis area is located at elevations ranging from 6,400 feet in the pinyon-juniper vegetation type to over 10,000 feet in the spruce-fir vegetation type. This wide range of vegetation and climatic relief provides for numerous recreation opportunities. Primary recreation access into this area is provided by the Hells Backbone Road (153).

Portions of the Grand Staircase Escalante National Monument are adjacent to the project area. There are approximately 4.75 miles of common boundary between the Pretty Tree Bench Vegetation Project and the monument.

3.2.2 RECREATION USE TRENDS

Although the district has no site specific data which would indicate the number of people who recreate within the project area, general recreation use trends nationally and across the forest are increasing. Demands for all forms of recreation are expected to increase over the next 50 years. For land based activities, the expected increases range from 53 percent to 80 percent (Forest Service, 1990). Since 1994, when the Escalante Interagency Visitor Center was first opened, visitation has steadily increased between 5 and 10 percent annually. The exception to this steady increase occurred in 1997 and 1998 when visitor counts increased by 58 percent and 35 percent respectively. The cause of this dramatic increase was the establishment of the Grand Staircase-Escalante National Monument in September of 1996. The projected increase in visitor use at the center for 1999 is 7 percent (Escalante Interagency Office, 1999). Although the majority of the increased visitation is most likely to occur on the monument, there will be some increase in use on the forest. An annual increase of five to ten percent in recreation use on the Escalante Ranger District could be expected.

3.2.3 CURRENT RECREATION ACTIVITIES

Historically, the major recreation pursuits in the analysis area include sight seeing/driving for pleasure, dispersed camping, hunting, fishing, hiking, horseback riding, Off Highway Vehicle (OHV) use, mountain biking, and winter sports. Other uses include fuelwood gathering and Christmas tree cutting for personal use.

3.2.3.1 SIGHT SEEING/DRIVING FOR PLEASURE

This is the largest recreation use in the analysis area. Nationally driving for pleasure is the single largest recreation use on Forest Service managed lands, constituting 36 percent of all recreation use (Forest Service, 1999). Driving for pleasure while observing scenery and wildlife occurs most often in the summer and fall. This use originates from the developed campgrounds at Posy Lake and Blue Spruce and also from State Highway 12, a designated Scenic Highway. Dramatic views occur along the Hells Backbone Road, culminating in the view of the Box-Death Hollow Wilderness Area from the Hells Backbone Bridge.

3.2.3.2 DISPERSED CAMPING

Dispersed camping occurs throughout the summer and fall seasons and is most often associated with hunting and fishing, although family reunions, scout groups and others also use the area. Campsites are located almost anywhere there is sufficient space to park a trailer or pitch a tent. This use occurs at McGath Lake, the meadows below McGath Lake, along the Hells Backbone Road between Sand Creek and the analysis area boundary, along the Roundup Flat Road, along the road to the Dry Lake trail head, and along the road which accesses the head of Bear Creek. These sites are in good condition and are classified as either Condition Class One or Two, according to the Frissell Condition Class Rating System (Frissell, 1978).

3.2.3.3 HUNTING

Hunting use in the analysis area occurs during different times of the year. In the spring, turkey hunters are prevalent in the area. The deer and elk seasons start in the late summer and end in early winter. Hunting is most often combined with dispersed camping.

3.2.3.4 FISHING

Fishing occurs throughout the analysis area primarily in the summer and fall. Fisheries are located in Sand Creek, Bear Creek, Lake Creek, Boulder Creek and McGath Lake. As is the case with hunting, fishing most often occurs in conjunction with dispersed camping.

3.2.3.5 HIKING

Hiking occurs primarily in the summer and fall. A portion of the Great Western Trail (GWT) lies along the northern boundary of the analysis area. The GWT is a continuous trail system extending from Canada to Mexico. Approximately 79 miles of the trail traverses the Escalante Ranger District. Portions of the Bear Creek (#1.2) and the McGath Lake (#1.3) sections are within the analysis area.

Bear Creek Section #1.2 - This section of the GWT begins at the Kings Pasture Trailhead and ends at the Dry Lake Trailhead. Although currently designated a non-motorized trail, the trail receives a significant amount of motorized use particularly during the hunting season. There has not been a NEPA decision which designates the use of this trail as non-motorized only. There are approximately 3.75 miles of the Bear Creek section within the analysis area.

McGath Lake Section # 1.3 - This section of the GWT begins at the Dry Lake Trailhead and ends at Pine Creek. That portion of the trail between the Dry Lake Trailhead and Black Lake is motorized. The majority of the trail is non-motorized. There are approximately 3.50 miles of the trail within the analysis area.

Dry Lake Trailhead - The Dry Lake Trailhead is located at the end of Forest Road 566. Facilities at the trailhead include parking, loading/unloading docks for OHVs and stock animals, and an information kiosk. This facility is designed to accommodate both motorized and non-motorized use.

Non-System Trails - There are two non-system hiking routes which access the Box-Death Hollow Wilderness Area. One leaves Forest Road 153 and follows Sand Creek south to the forest boundary. The second route starts at Salt Gulch and follows an old wagon road west to Sand Creek. Neither of these routes are part of the districts trail system and they are not maintained.

3.2.3.6 OFF HIGHWAY VEHICLE (OHV) USE

The entire Pretty Tree Bench Vegetation analysis area except for the following two exceptions is available for motorized use. The Box-Death Hollow Wilderness Area (Management Area 8A) and the Big Game Winter Range (Management Area 5A) are closed to all motorized use. Trails within closed areas are for non-motorized use only (Dixie National Forest Travel Map, 1998 and The LRMP for the DNF, 1986).

3.2.3.7 MOUNTAIN BIKING

This is not a common use within the analysis area, but is increasing as the area becomes better known. This use is being actively promoted by several businesses in the area. The Hells Backbone Road is a popular route among the tour groups in the area.

3.2.3.8 WINTER SPORTS

Although winter sports such as snowmobiling and cross country skiing occur in the area, occurrence is minimal.

3.2.3.9 OTHER

Recreation uses such as fuelwood gathering and cutting of personal use Christmas trees are minimal.

3.2.4 LAND AND RESOURCE MANAGEMENT PLAN (LRMP) FOR THE DIXIE NATIONAL FOREST

3.2.4.1 PLAN DIRECTION

The LRMP designates the following management areas as representing recreation emphasis in the analysis area: 2A-Semi-Primitive Recreation, 2B-Roaded Natural Recreation, 8A-Wilderness.

Semi-Primitive Recreation - This designation provides for a special kind of outdoor experience, one dependent on a perception of remoteness. It also provides for opportunities of active management including habitat improvement, timber harvest and travel management.

Roaded Natural Recreation - This management area is the travel corridor along the Hells Backbone Road. Management emphasis is for motorized and non-motorized recreation activities such as driving for pleasure, viewing scenery, picnicking, fishing, snowmobiling, and cross country skiing.

Wilderness - Management emphasis is to provide for the protection and perpetuation of essentially natural bio-physical conditions. Solitude and a low level of encounters with other users or evidence of past use is an essential part of the social setting.

3.2.5 CUMULATIVE EFFECTS AREA (CEA)

For the recreation resource the CEA is that area bounded on the west by the Aquarius-Teasdale Road (154), on the north by the Aquarius Plateau Rim, and on the south and east by Utah State Highway 12. The CEA would include the communities of Escalante and Boulder. The Blue Spruce Campground, one of three developed camping facilities on the district, is within the CEA. The Aquarius-Teasdale Road, State Highway 12 and the Hells Backbone Road are the major access routes into the project area. Access from the north is limited by the southern rim of the Aquarius Plateau, a natural geographic boundary between those lands on the plateau which are dominated by a spruce/fir vegetation type and the mosaic of vegetation types which occur below the rim.

Within the CEA past management activities have included timber harvesting and associated road construction, motorized and non-motorized trail development including the Great Western Trail, soil stabilization projects, and livestock grazing. The majority of the timber harvesting has occurred in

the ponderosa pine and mixed conifer vegetation types. Portions of the trail system including the Great Western Trail are located on old logging roads. Soil stabilization projects consisting of head-cut rehabilitation as part of the Sand Creek Soil Stabilization Project (Forest Service, 1995). Livestock grazing is permitted on the entire CEA.

Within the foreseeable future (5-7 years), management activities which are likely to occur are the continuation of livestock grazing, soil stabilization projects including road closures, improvements to the trail system, and timber harvests in both the aspen and conifer vegetation types.

3.2.6 WILDERNESS

3.2.6.1 OVERVIEW

The Utah Wilderness Act of 1984, which was signed by President Reagan on September 28, 1984, designated the Box-Death Hollow area for inclusion in the National Wilderness Preservation System (Public Law 98-429,1984). In addition to establishing the Box-Death Hollow Wilderness Area, the act included several provisions pertinent to the Pretty Tree Bench analysis:

- areas in the State of Utah not designated wilderness upon enactment of this Act shall be managed for multiple use in accordance with land management plans;

- unless expressly authorized by Congress, Department of Agriculture shall not conduct any further statewide roadless areas review and evaluation of national forest system lands in the State of Utah for the purpose of determining their suitability for inclusion in the National Wilderness Preservation System;

- Congress does not intend that designation of wilderness areas in the State of Utah lead to the creation of protective perimeters or buffer zones around any wilderness area. The fact that nonwilderness activities or uses can be seen or heard from areas within the wilderness shall not, of itself, preclude any activities or uses up to the boundary of the wilderness area.

3.2.6.2 SETTING

The Box-Death Hollow Wilderness Area encompasses approximately 25,548 acres and is located north and east of the town of Escalante, Utah. Steep walled canyons with gray-orange crossbedded Navajo sandstone, mesas and plateaus are the major landforms. The major vegetation includes open stands of ponderosa pine and pinyon pine/juniper. At the higher elevations, stands of mixed conifer and aspen occur.

The wilderness is divided into three separate canyons, all tributaries of the Escalante River. The steeply dipping Escalante monocline, dissected by Pine Creek, makes up the portion of the wilderness known as the Box. The gently dipping monocline to the east of the Box contains the headwaters of Death Hollow Creek, the second tributary. The Box and Death Hollow canyons are separated by Antone Bench which is not part of the wilderness area. The third canyon tributary, located east of Death Hollow, is Sand Creek.

That portion of the Sand Creek drainage between the creek and the eastern boundary of the wilderness area is within the Pretty Tree Bench analysis area. This area is an estimated 2,749 acres in size or eight percent of the total analysis area. A portion of the Grimes Creek timber sale, which

was harvested before wilderness designation, is located within this area. There is an estimated 212 acres of harvest units and 1.4 miles of constructed roads within this portion of the wilderness area.

These management activities occurred prior to the Utah Wilderness Act of 1984 and designation of the Box-Death Hollow Wilderness Area.

3.2.6.3 ACTIVITIES AND USE TRENDS

There are no system trails within the Box-Death Hollow Wilderness Area. A route through the Box has developed over time. Generally this route follows Pine Creek. The Upper and Lower access points to the Box are signed on the Hells Backbone Road (FR 153). Hiking through Death Hollow and Sand Creek are cross country excursions with no developed routes. The access point to Death Hollow is signed on Forest Road 153. The only signing in the Sand Creek drainage is where Forest Road 153 crosses Sand Creek.

Current conditions in the wilderness area indicate a low level of use with a high opportunity for solitude. It is unlikely that parties will encounter each other in Death Hollow or Sand Creek, but is possible in the Box. Most of the use in the Box is by day hikers. In contrast, the Death Hollow and Sand Creek users are backpackers who spend 3-5 days hiking down to the Escalante River.

Due to its location, the Hells Backbone Road (FR 153) provides numerous scenic overlooks into the wilderness. This type of recreation activity (driving for pleasure/viewing scenery) has been increasing since the designation of State Highway 12 as a Scenic Highway and the designation of the Grand Staircase-Escalante National Monument.

The Recreation Opportunity Spectrum (ROS) class in the wilderness area is Preservation.

3.2.6.4 LAND AND RESOURCE MANAGEMENT PLAN (LRMP) FOR THE DIXIE NATIONAL FOREST

The Box-Death Hollow Wilderness Area is in Management Area 8A - Wilderness. Management emphasis is to provide for the protection and perpetuation of essentially natural bio-physical conditions. Solitude and a low level of encounters with other users or evidence of past use is an essential part of the social setting (LRMP, Chapter IV, page 121).

3.2.6.5 CUMULATIVE EFFECTS ANALYSIS (CEA) AREA

For the wilderness resource the CEA is that area within the boundaries of the Box-Death Hollow Wilderness Area. With the exception of limited management activities which occurred prior to the passage of the Utah Wilderness Act, the lands within the Box-Death Hollow Wilderness Area retain their primeval character and influence without permanent improvements or human habitation.

Within the wilderness area land management activities have occurred. Along the eastern edge of the wilderness area a portion of the Grimes Creek Timber Sale was located. There is an estimated 212 acres of harvest units and 1.4 miles of constructed road. Along the western edge of the wilderness area there is an abandoned gravel pit approximately five acres in size and approximately 20 acres of pinyon/juniper which has been chained and seeded to grass. Livestock grazing occurs along the western edge of the wilderness area primarily in the chained areas. This activity will most likely continue since it was an established use prior to the designation of the wilderness area.

3.3 ROADLESS/UNDEVELOPED RESOURCE

3.3.1 INTRODUCTION

This section will describe the existing condition of four Inventoried Roadless Areas (IRAs), portions of which occur within the analysis area. These include the Boulder Mountain/Boulder Top/Deer Lake (No.07040), McGath Lake/Auger Hole (No.070034), Box-Death Hollow (No.07033), and New Home Bench (No.07035) IRAs. All four IRAs occur entirely within the Dixie National Forest. Only one of them of them, the Box-Death Hollow IRA, was recommended for and designated as wilderness.

Secondly, additional parcels of undeveloped/unroaded lands 1,000 acres or larger occurring outside of the IRAs and within the analysis area will be identified. Of these parcels, only those that meet the 5,000 acre minimum standard or aggregate with other undeveloped areas to meet it will be described in terms of wilderness attributes. IRA parcels of every size will likewise be analyzed in terms of the wilderness attributes listed below:

Natural Integrity/Apparent Naturalness

Natural integrity is the extent to which long term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human induced change to an area. Apparent naturalness means that the environment looks natural to most people using the area.

Solitude/Primitive Recreation

Solitude is a personal and subjective value, defined as isolation from the sights, sound and presence of others as well as human developments. Primitive recreation is a perceived condition of being secluded, inaccessible and out of the way. The physical factors that can create primitive recreation settings include topography, vegetative screening, distance from human impacts such as roads and logging operations (sight and sound) and difficulty of travel. A user's sense of remoteness in an area is also influenced by the presence or absence of roads, their condition and whether they are open to motorized vehicles.

Special Features/Special Places/Special Values

These consist of unique geological, biological, ecological, cultural or scenic features that may be located in a roadless area.

Wilderness Manageability/ Boundaries

These are elements that relate to the ability of the Forest Service to manage an area to meet size criteria and the attributes discussed above. The shape of an area and changes of that shape influence how it can be managed.

3.3.1.1 INVENTORIED ROADLESS AREAS

The term "Inventoried Roadless Area" refers to an area of at least 5,000 acres, without developed and maintained roads and substantially natural. A roadless area is specifically defined as an area that

meets minimum criteria for wilderness. The Wilderness Act of 1964 defines wilderness and wilderness attributes. As part of the nationwide Roadless Area Review and Evaluation (RARE and RARE II) in the 1070's and a subsequent local inventory in 1083, the IRA's listed below were identified. The descriptions which follow are based on the narratives that accompany that evaluation. Copies of the narratives may be fund in the Pretty Tree Bench project file.

Within the 33,929 acre analysis area, approximately 7,373 acres (22%) comprise those currently roadless portions of the four IRAs that occur within the analysis area. These lands are shown in Appendix 3, Map F.

Boulder Mountain/Boulder Top/Deer Lake IRA (No.07040)

General Description

The Boulder Mountain/Boulder Top/Deer Lake IRA is located on the Aquarius Plateau south of Teasdale, Utah and on the transition slopes leading to the plateau (Appendix 3, Map F). The topography varies from flat lands to steep rocky cliffs, with an average elevation of 9,000 feet. The area is vegetated with a variety of tree species with extensive, intermingled areas of sagebrush and grass. Since that portion of the IRA falling within the Pretty Tree Bench analysis area remains unroaded, it falls into Suspension Category 1 of the Interim Roads Rule (36 CFR 212).

Changes

The GIS data base for roadless areas has the Teasdale District portion of the Boulder Mountain/Boulder Top/Deer Lake IRA at 95,868 acres. This projects a figure of 15,314 acres for the Escalante District portion for a total of 111,182 acres. These figures are subject to revision as field verification of past development proceeds. Analysis reveals that no development has occurred on the 243 acre portion of the IRA that falls within the Pretty Tree Bench analysis area.

Public Support

During preparation of the Boulder Land Use Plan and EIS in 1975, there was considerable interest in the "Boulder Top" becoming wilderness. In the 1983 roadless area re-evaluation, however, it was not carried forward for wilderness consideration.

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness

The apparent naturalness and natural integrity of the IRA is low overall because the irregularly shaped perimeter and location of roads and developments prevent sufficient distance between the perimeter and center. However, the 243 acres falling in the analysis area have generally been unaffected, with the imprint of man's work substantially unnoticeable. Those acres generally appear to have been affected primarily by the forces of nature.

Solitude and Primitive Recreation

Opportunities for solitude and primitive recreation in the IRA are low overall for the same reasons as stated directly above. Again, those acres falling within the analysis area offer somewhat better opportunities for solitude and primitive recreation because they are more removed from the extensive roading and development evident in the central portion of the IRA.

Special features, Special Places or Special Values

The "Boulder Top" is considered a special place by many recreationists. The large number of lakes, and spectacular basalt cliffs contribute greatly to this interest.

Wilderness Manageability and Boundaries
The IRA has some very complex and irregular boundaries which extend considerably beyond the topographically distinctive edge of the Aquarius Plateau. In its present configuration, the IRA would be difficult to manage as a wilderness area.

McGath Lake/Auger Hole IRA (No.070034)

General Description

The McGath Lake/Auger Hole IRA is located primarily in the transition zone south of the Aquarius Plateau about 15 miles north of Escalante, Utah (Appendix 3, Map F). The northern 1,012 acres overlaps the plateau itself. The topography is generally steep and rocky and is vegetated predominately by ponderosa pine, Douglas fir and aspen trees. The unroaded portion (32 acres) of the IRA falling within the Pretty Tree Bench analysis area falls into Suspension Category 1 of the Interim Roads Rule (36 CFR 212).

Changes

The GIS data base for roadless areas has the McGath Lake/Auger Hole IRA at 8,328 acres. This is greater than the figure of 7,040 acres listed in the 1983 Inventory because of the improved accuracy in mapping. Roading and development resulting from the Grimes Creek Timber Sale occupies 85 acres (73%) of the 117 acre portion of the IRA that falls within the Pretty Tree Bench analysis area.

Public Support

During preparation of the Boulder Land Use Plan and EIS in 1975, there was very little interest in the IRA as wilderness. In the 1983 roadless area re-evaluation, it was not carried forward for wilderness consideration.

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The apparent naturalness and natural integrity of the IRA is low overall because the location of roads and developments prevent sufficient distance between the perimeter and center.

Solitude and Primitive Recreation
Opportunities for solitude and primitive recreation in the IRA are low overall for the same reasons as stated directly above. This is particularly true for most of that portion of the IRA falling in within the analysis area.

Special features, Special Places or Special Values
While the unit is scenic with its timbered slopes and live streams, it is not uniquely scenic. There are no particular attractions on the unit.

Wilderness Manageability and Boundaries
The IRA does not contain the distinct boundaries necessary for a potential wilderness area.

Box-Death Hollow IRA (No.07033)

General Description

The Box-Death Hollow IRA is located about 5 miles north of Escalante, Utah (Appendix 3, Map F). The topography is generally steep and rocky and is vegetated predominately by pinyon and juniper. An unroaded portion (consisting of 450 acres in scattered parcels discussed below) of the IRA within the Pretty Tree Bench analysis area falls into Suspension Category 1 of the Interim Roads Rule (36 CFR 212). The 1,098 acre portion of the IRA at the south end of the analysis area falls into Suspension Categories 1 and 4.

Changes

The current GIS data base for roadless areas has the Box-Death Hollow IRA at 3,177 acres, 1,098 of which fall within the Pretty Tree Bench analysis area (see Appendix 3-Map F). All of the 1,098 acres are considered to possess roadless character. Formerly, about 4,297 acres of the IRA fell within the analysis area. Of these acres, 2,749 were incorporated into the Box-Death Hollow Wilderness Area and 450 were left as scattered parcels along the east side. The wilderness area now encompasses about 25,548 acres.

Public Support

During preparation of the RARE II EIS in 1979, there was great interest in the area as wilderness. In 1984, 2,749 acres of what is now the Pretty Tree Bench analysis area were formally designated as part Box-Death Hollow Wilderness Area.

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The natural integrity and apparent naturalness of the IRA is high overall because of the lack of roads and development.

Solitude and Primitive Recreation
Opportunities for solitude and primitive recreation in the IRA are high because of the area's remoteness and ruggedness.

Special features, Special Places or Special Values
Scenic values are high due to the colorful rock formations and canyons. The Box and Death Hollow canyons are considered special places by many recreationists.

Wilderness Manageability and Boundaries
The IRA contains the distinct hydrologic boundaries necessary for a wilderness area.

New Home Bench IRA (No.07035)

General Description

The New Home Bench IRA is located primarily in the transition zone south of the Aquarius Plateau about 15 miles northeast of Escalante, Utah (Appendix 3, Map F). The topography varies from gentle, rolling lands to steep rocky slopes and the area is vegetated predominately by ponderosa

pine, Douglas fir, aspen, pinyon, and juniper. As discussed below, the remaining unroaded 6,000 acre portion of the IRA falls into Suspension Category 1 of the Interim Roads Rule (36 CFR 212). Those portions of the 360 acres discussed below that are one-quarter mile or more from FR 514 (Road Draw) also fall into Suspension Category 1.

Changes

The GIS data base for roadless areas has the New Home Bench IRA at 10,505 acres, approximately 9,775 acres of which falls within the analysis area boundary. Of the 9,775 acres, about 3,415 acres have now been developed, leaving 6,000 acres in the IRA (see Appendix 3-Map F). Approximately 360 roadless acres were isolated along the northwest boundary of the IRA when development occurred. Seventy nine (79) of the 360 acres are adjacent to Undeveloped/Unroaded Area No. 1 and have been combined with it for this analysis. Two hundred and twenty five (225) of the isolated acres were combined with Undeveloped/Unroaded Area No. 6 and the remaining 56 acres were joined to developed lands to the east.

Public Support

During preparation of the Boulder Land Use Plan and EIS in 1975, there was very little specific interest in the this IRA as wilderness. The area was allocated to non-wilderness in the final EIS.

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The apparent naturalness and natural integrity of the IRA is low overall because the location of roads and developments prevent sufficient distance between the perimeter and center. The 6,000 roadless acres comprising the southern two thirds of the IRA still possess a moderately high degree of natural integrity and apparent naturalness.

Solitude and Primitive Recreation
Taken as a whole, opportunities for solitude and primitive recreation in the IRA are low for the same reasons as stated directly above. However, there are still opportunities for solitude and primitive recreation in the 6,000 acres referenced directly above.

Special features, Special Places or Special Values
While the unit is scenic, it is not uniquely scenic. There are no particular attractions on the unit.

Wilderness Manageability and Boundaries
The IRA does not contain the distinct boundaries necessary for a potential wilderness area.

3.3.1.2 ADDITIONAL UNDEVELOPED/UNROADED AREAS

In addition to addressing Inventoried Roadless Areas, it is important to analyze other undeveloped/ unroaded lands within the analysis area. Another approximately 10,073 acres have been identified as undeveloped/unroaded by applying the criteria outlined in the Draft Intermountain Planning Desk Guide for Roadless Area Inventory and Evaluation, June 30, 1998. In this guide, a roadless area is described as 1) containing at least 5,000 acres, 2) not containing improved roads maintained for travel by standard passenger-type vehicles (FSH 1909.12,7.11), and 3) not containing non-structural improvements greater than 5 acres in size such as chainings, terracing, reservoirs, and unrecovered clearcuts or where the level of development is substantially noticeable (presence of other facilities or

influence of man). The Interdisciplinary Team responsible for analysis disqualified lands where the effects of timber harvest and road building were still substantially noticeable. Disqualifying disturbances included the presence of stumps, rootwads, slash, and skid trails as well as evidence of pre-commercial thinning and the more obvious road construction.

The Undeveloped/Unroaded Areas may be viewed in the Appendix 3-Map F.

Undeveloped/Unroaded Area No. 1 (1,764 acres)

General Description

Area No. 1, measuring 1,685 acres, is located east of FR 566 and northeast of FR 514 (Appendix 3, Map F). Haw's Pasture borders the area on the east. For this analysis, an isolated 79 acre undeveloped portion (north of FR 514) of the New Home Bench IRA has been added for a total of 1,764 acres. The topography varies from gentle, rolling lands to steep rocky slopes and the area is vegetated predominately by aspen with some Douglas fir and Ponderosa pine. While the Area's 1,764 acres falls short of the 5,000 acre minimum required for roadless, it aggregates with other undeveloped lands to the northwest to exceed that figure. For that reason, it will be analyzed in this document. The 1,685 acres of undeveloped lands fall into Suspension Category 2 of the Interim Roads Rule (36 CFR 212). The 79 IRA acres do not fall into Suspension Category 1 because they lie within one-quarter mile of FR 514 (Road Draw), a classified road.

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The natural integrity of Area No. 1 is high due to the lack of roads and development. Most people using the area would consider the environment to look natural.

Solitude and Primitive Recreation
If combined with the adjacent undeveloped lands to the northwest, opportunities for solitude and primitive recreation in the area would be moderate to high.

Special features, Special Places or Special Values
While the unit is scenic with its timbered slopes, it is not uniquely scenic. There are no particular attractions on the unit.

Wilderness Manageability and Boundaries
Standing alone, the area does not exhibit boundaries suitable for a potential wilderness area.

Undeveloped/Unroaded Area No. 2 (2,868 acres)

General Description

Area No. 2 is a 2,418 acre linear parcel of undeveloped lands located between the Box-Death Hollow Wilderness Area and FR 153 (Appendix 3, Map F). The creation of the Box-Death Hollow Wilderness Area out of the Box-Death Hollow IRA left several scattered parcels of roadless along the west border of Area No.2. These parcels, totaling 450 acres, have been combined with Area No. 2 for purposes of this analysis. The topography is generally steep and rocky and is vegetated predominately by pinyon and juniper. While the total 2,868 acres falls short of the 5,000 acre minimum required for roadless, it aggregates with other undeveloped lands to the west (Box-Death

Hollow Wilderness Area) and Box-Death Hollow IRA lands to the south to exceed that figure. For that reason, it will be analyzed in this document. The remaining unroaded 450 acres (scattered parcels) of the IRA within the Pretty Tree Bench analysis area fall into Suspension Category 1 of the Interim Roads Rule (36 CFR 212). The 2,418 acres of undeveloped lands fall into a combination of Suspension Categories 2 and 4.

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The natural integrity of Area No. 2 is high due to the lack of roads and development. Most people using the area would consider the environment to look natural.

Solitude and Primitive Recreation
Because of its linear configuration and adjacency to FR 153, the Area possesses low values in solitude and primitive recreation. However, if combined with the wilderness lands to the west and/or the IRA lands to the south, the opportunities for solitude and primitive recreation in the area would be greatly increased.

Special features, Special Places or Special Values
As an adjunct to the colorful rock formations and canyons to the west, the scenic values are high. The Box and Death Hollow canyons are considered special places by many recreationists.

Wilderness Manageability and Boundaries
Standing alone, the Area does not exhibit boundaries suitable for a potential wilderness area.

Undeveloped/Unroaded Area No. 3 (3,371 acres)

General Description

Area No. 3 is a five mile long, 3,371 acre parcel located between FR 153 and the Salt Gulch Ranch private land and the New Home Bench IRA (Appendix 3, Map F). The topography is generally steep and rocky and is vegetated predominately by pinyon and juniper with some ponderosa pine on the north end. While the area standing alone does not meet the 5,000 acre requirement for roadless, it would total 11,641 acres if combined with the adjacent New Home Bench IRA and Undeveloped/Unroaded Area No. 4 to the northeast and east respectively. Area No. 3 will be analyzed as undeveloped/unroaded in this document. The 3,371 acres of undeveloped lands fall into Suspension Category 2 of the Interim Roads Rule (36 CFR 212).

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The natural integrity of Area No. 3 is high due to the lack of roads and development. Most people using the area would consider the environment to look natural. If combined with the adjacent IRA and Area No.4, it would possesses an even higher degree of natural integrity and apparent naturalness.

Solitude and Primitive Recreation
Because of its linear configuration and adjacency to FR 153, the Area possesses low values in solitude and primitive recreation. If combined with the New Home Bench IRA and Area No.4, there would be better opportunities for solitude and primitive recreation.

Special features, Special Places or Special Values
While the unit is scenic with its rocky ridges, it is not uniquely scenic. There are no particular attractions on the unit.

Wilderness Manageability and Boundaries
Standing alone, the Area does not exhibit boundaries suitable for a potential wilderness area. If this Area was combined with the IRA New Home Bench and Area No.4, it comes closer to having a manageable boundary. FR 153, the Salt Gulch private land, and Utah State Highway 12 provide a more logical boundary than it formerly had.

Undeveloped/Unroaded Area No. 4 (2,090 acres)

General Description

Area No. 4 is a 2,090 acre parcel located between Utah State Highway 12 and the New Home Bench IRA (appendix 3, Map F). The topography is generally steep and rocky and is vegetated predominately by pinyon and juniper. While the area standing alone does not meet the 5,000 acre requirement for roadless, it totals 11,461 acres when combined with adjacent New Home Bench IRA and Area No. 3 to the northwest and west respectively. It will be analyzed as undeveloped/unroaded in this document. The 2,090 acres of undeveloped lands fall into Suspension Category 2 of the Interim Roads Rule (36 CFR 212).

Existing Wilderness Attributes

Natural Integrity and Apparent Naturalness
The natural integrity of Area No. 4 is high due to the lack of roads and development. Most people using the area would consider the environment to look natural. If combined with the adjacent IRA and Area No.3, It would possess an even higher degree of natural integrity and apparent naturalness.

Solitude and Primitive Recreation
Because of its linear configuration and adjacency to FR 153, the area possesses low values in solitude and primitive recreation. If combined with the New Home Bench IRA and Area No. 3, there would be better opportunities for solitude and primitive recreation.

Special features, Special Places or Special Values
While the unit is scenic with its rocky ridges, it is not uniquely scenic. There are no particular attractions on the unit.

Wilderness Manageability and Boundaries
Standing alone, the Area does not exhibit boundaries suitable for a potential wilderness area. If this Area was combined with the IRA acres and Area No.3, it comes closer to having a manageable boundary. FR 153, the Salt Gulch private land, and Utah State Highway 12 provide a more logical boundary than it formerly had.

Undeveloped/Unroaded Area No. 5 (1,663 acres)

General Description

Area No. 5 is a 1,663 acre undeveloped parcel located southeast of McGath Lake. The area is bounded by McGath Lake, FR 475 (the Great Western Trail), FR 566, and FR 494. While this area

is undeveloped, it is isolated from IRAs and other undeveloped lands by constructed/maintained roads. Since there is no chance of the Area being aggregated into an undeveloped area of 5,000 acres or more, it will not be analyzed further in this document.

Undeveloped/Unroaded Area No. 6 (1,326 acres)

General Description

Area No. 6 is a 1,101 acre undeveloped parcel located along the east side of FR 566 and south of FR 514 (Road Draw). It is bounded by those two corridors as well as FR 153 and the developed lands in the west end of the Sweetwater Timber Sale Area. For this analysis, an isolated 225 acre undeveloped portion of the New Home Bench IRA has been added for a total of 1,326 acres. Since the whole undeveloped area is isolated from IRAs and other undeveloped lands by constructed/maintained roads, there is no chance of it being aggregated into an area of 5,000 acres or more. Consequently, it will not be carried forward for analysis in this document.

3.3.2 FOREST PLAN DIRECTION

The LRMP does not have a section entitled "roadless" and does not provide direction for the roadless resource. However, it does make land allocations and gives Management Area direction that crosses over roadless area boundaries. A roadless area is therefore an inventory classification, not a management category.

3.3.2.1 DESIRED FUTURE CONDITION

The LRMP did not specifically state a desired future condition for roadless character. However, it allocated portions of the Pretty Tree analysis area to Management Areas 2A, 2B, 5A, 6A, 7A, and 8A2 in which management activities could result in loss of roadless character and wilderness potential. Prior to implementation of activities within a Management Area, an assessment of site specific environmental consequences, including any impacts to IRAs will be determined, and disclosed.

3.3.3 ROADLESS AREA CUMULATIVE EFFECTS AREA (CEA)

For the Roadless/Undeveloped resource, the CEA consists of both the Escalante and Teasdale Districts of the Dixie National Forest as well as the surrounding communities of Bicknell, Teasdale, Torrey, Escalante and Boulder. This area was selected because the analysis area falls essentially between the two districts and because the listed communities would be most affected by any changes in roadless/undeveloped conditions. Presently, there are thirteen (13) IRAs in the CEA with a total of 305,806 acres.

3.4 VISUAL QUALITY

3.4.1 INTRODUCTION TO VISUAL QUALITY

National Forest Visual Landscape Management is the planning and design of the visual aspects of multiple use land management. It is based on the criteria and guidelines in the Visual Management System, Agriculture Handbook No. 462, NFLM, Vol. 2.

3.4.2 THE VISUAL SETTING

The Pretty Tree Bench Vegetation Project analysis area is a moderately used dispersed recreation area falling between the Sand Creek and Boulder Creek drainages and northeast of the Box-Death Hollow Wilderness Area. Most of the recreation use occurs during the summer and fall.

The Hell's Backbone Road (Forest Road 153) provides primary recreation access to the proposed treatment area. This arterial is located in Management Area (MA) 2B, Roaded Natural Recreation, as designated in the Dixie National Forest Land and Resource Management Plan (1986).

3.4.3 VISUAL QUALITY AS SEEN FROM MAJOR TRAVEL CORRIDORS

Visual Quality Objectives (VQO's) are desired levels of scenic quality based on the physical and sociological characteristics of the area. The Visual Quality Objectives refer to degrees of acceptable alteration of the landscape. VQO's incorporate two aspects of landscape scenery:

1. The variety of the physical features of the land. That is, landscapes that have more natural variation in their makeup can better absorb alteration, or imposed variation, without affecting VQO's for those landscapes, and

2. The sensitivity for scenic quality of the people, based on the number and interest of the people viewing the landscape.

Most of the analysis area is within the foreground and middleground view zones of the following corridors which are shown with their existing VQs as viewed in the foreground:

		LRMP Standards/Guides		Existing Foreground VQ		
Forest Road #	**Sensitivity Level**	**Retention**	**Partial Retention**	**Retention**	**Partial Retention**	**Modification**
#153	1	100%		57%	43%	
# 566	2		100%	19%	63%	18%
# 699	2		100%	10%	68%	22%
# 166	2		100%	15%	85%	
# 514	2		100%	45%	55%	
GWT	1	100%		69%	31%	
Hwy 12	1	100%		90%	10%	

There are insufficient distances within the project area to permit any background views from the major visual corridors.

3.4.4 LANDSCAPE CHARACTER AND VARIETY CLASS

The characteristic landscape ranges from 6,600 to 10,200 feet in elevation and covers plant communities ranging from pinyon-juniper through oak, ponderosa pine, aspen and spruce/fir. The major part of the project area lies in the transition zone between the Aquarius rim and the slickrock country in the Box-Death Wilderness Area.

There are three variety classes which identify the scenic quality of a natural landscape:

Class A - Distinctive
Class B - Common
Class C - Minimal

Most of the analysis area has been classified as being "Common" (Class B) to the characteristic landscape as found in elevation changes, landforms and vegetative makeup. The exception to this is the Box-Death Wilderness portion of the area which is classified as "Distinctive" (Class A).

Form is found in the long sweeping ridge lines and deep v-shaped canyons. One of the most dramatic forms in the analysis area is the rugged Sand Creek drainage which dominates the southwest side of the analysis area. Line is expressed in the short vertical reaches of the conifers, aspens and snags. Color is a blend of the rich green of the conifers, the lighter green of the aspens, the dusty green of the junipers, and the grey of the sage. In the fall, the yellow and gold colors of the aspen leaves provide striking contrast to the dark green conifers. In the winter, the muted grey branching of the aspens provides soft relief to the sharp dark green conifers. Conifers contrast sharply with the white snowfields of the winter. Texture varies from the roughness of the piñyon-juniper to the softness of the aspen foliage and meadows.

3.4.5 SENSITIVITY LEVEL AND VISUAL QUALITY OBJECTIVES

The majority of people traveling along the Hell's Backbone Road 153 and along the Great Western Trail are there for recreation purposes and their concern for scenic quality is high. As a result, a Sensitivity Level rating of 1 (high) is assigned these corridors. Forest Road 153 also falls in Management Area 2B, Roaded Natural, where cutting patterns should blend with landscape character in order to meet the target VQO.

Along Sensitivity Level 1 roads/trails, the VQO in the foreground (1/4 to 1/2 miles from the travel route) is Retention. This means management activities, should only repeat form, line, color, and texture which are frequently found in the existing landscape. Changes in the size, amount, intensity, direction and pattern should not be evident when viewed by the casual observer and management activities should not be visually evident.

Beyond the Foreground view zone is the Middleground, which extends for 3 to 5 miles on either side of FR 153 and the Great Western Trail. The VQO for the seen Middleground of a Sensitivity Level 1 corridor is Partial Retention. With this VQO, management activities should remain visually subordinate to the characteristic landscape. Activities may also introduce form, line, color and texture, but changes should remain visually subordinate to the visual strength of the landscape.

There are sufficient numbers of people interested in scenic values traveling through the analysis area on Forest Road (FR) 566 and Road Draw Road 514 to warrant a Sensitivity 2 (moderate) designation. The VQO for the Foreground of a Sensitivity Level 2 corridor is Partial Retention while the Middleground merits Modification. Areas which are not visible from Concern Level 1 and 2 corridors merit a Modification (low) VQO.

Management Area 8A2 requires a VQO of Retention and 8A (Wilderness) requires Preservation.

The existing VQO's for the analysis area are: Preservation 2,749 acres, Retention 7,455 acres, Partial Retention 11,525 acres, and Modification 12,200 acres.

3.4.6 CURRENT VISUAL CONDITIONS

The topography is generally rolling, with several strong ridge lines defining steep canyons, particularly at Sand Creek. Compelling views are available looking southward beyond the analysis area and into the Box-Death Wilderness Area. The dominant visual characteristic is the form of the

slickrock Sand Creek drainage followed by the texture of the vegetation with the aspen color becoming visually dominant in the fall.

3.4.7 VISUAL QUALITY CUMULATIVE EFFECTS AREA

For the visual resource, the CEA is the entire analysis area plus the area bounded on the west by Roger Peak, on the north by the Aquarius Plateau Rim, on the east by the analysis area boundary, and on the south by the Sand Creek RNA site. The additional area was added because much of the western portion of the analysis area is visible from FR 153 as it switchbacks higher to the west.

3.5 SOILS

3.5.1 DESCRIPTION

In the National Hierarchical Framework, the Pretty Tree Bench Analysis Area occurs in the Dry Domain, Temperate Desert Regime Mountains Division, Nevada-Utah Mountains Semi-Desert Coniferous Province, and Utah High Plateaus and Mountains Section. At the subsection level, the northern half of the Analysis Area occurs in the Aquarius Plateau/Boulder Top Subsection while the southern half occurs in the Circle Cliffs-Escalante Benches-Kaiparowits Plateau Subsection.

3.5.1.1 ON-SITE SOIL EROSION/CRITICAL WATERSHED AREAS

The lower elevations of the watershed have soils formed from sedimentary rock formations (soil map units 429, 432, 444, 474, 475, 477, 521, and 546). The middle and upper elevations of the watershed have soils formed from volcanic rock formations (soil map units 441, 505, 521, 523, 524, 528, 529, 532, 534, 538, 539, 541, 543, and 545). Soil map units 240, 420 and L405 formed in alluvial deposits. A description of the soil units and soils map is included in the project file.

Generally speaking, the soils formed from volcanic rocks have low erosion hazard ratings, while soils formed from sedimentary rocks are more susceptible to erosion, particularly those soil map units with steep slopes and significant amounts of rock outcrop (soil map units 429, 444, 474 and 475). These particular soil map units can yield high amounts of sediment during periods of intense summer thunderstorms (these are naturally high sediment producing soils and, depending on any one particular year's climatic events, natural sediment yield can be extremely variable).

A number of soils mitigations/precautions were identified within the Pretty Tree Bench Analysis Area that were considered in the design of the project during the NFMA analysis part of the project (see App. 3 Map L). To ensure that the soil and water resources are properly protected the areas have been avoided or precautions applied if burning is to be done. These are primarily areas of soil erosion/sedimentation or exotic plant related concerns, and occur in mainly P-J areas. Details of specific concerns are included in the project file. Other critical watershed areas of water related concerns are described in the hydrology sections of the NEPA document.

Steep slopes: Areas with slopes >40% have been identified for the analysis area. These areas are excluded from timber harvest.

Unsuitable lands (IRD/Regeneration): Areas with soils that are susceptible to irreversible resource damage or are difficult to regenerate if logged have been identified. These include all or parts of soil map units 444.

Slump: The ditch conveying water from McGath Lake crosses a steep slope that has slumped in the past. The slope failure was most likely due to saturation from the ditch on an unstable geologic formation. The ditch has since been piped through the unstable portion of the slope.

Gullies: Three areas with developed gully systems occur in the vicinity of Grimes Creek in sections 27 and 34, T32 S.,R3E. Treatment of these areas was done in the Sand Creek Soil Stabilization Project, August 1997. Treatment included shaping the systems to stable slopes, seeding, applying erosion mat where needed, and fencing the areas to exclude livestock; the areas are identified on App. 3 Map M.

Roads: A number of roads within the Pretty Tree Bench Analysis Area are contributing sediment to streams. Unacceptable amounts of erosion are occurring because of poor road location, improper maintenance of drainage structures, lack of proper drainage structures, etc. As with the gully systems mentioned above, treatment of these roads was considered in the Sand Creek document referenced above. Problem roads addressed in that analysis include FS Roads 163, and 474. Road 163 was identified for corrective action. Relocation or maintenance work Road 494 is suspended pending RS 2477 status determination. The lower portion (approximately 200') of Road draw road is contributing sediment to bear creek due to failure of drainage structures.

Roundup Flat Borrow Pit: The gravel pit located on the slope above Roundup Flat is in need of rehabilitation. As with the roads and gullies discussed above, treatment of this area was analyzed and approved in the Sand Creek soil stabilization document. No work has yet been done on the pit.

Long Term Soil Productivity: The long term sustainability of forests and rangelands depends on maintaining the quality of soil properties and conditions that affect the productivity and hydrologic functioning of soils. The maintenance of soil qualities that affect soil productivity and hydrologic function are soil quality standards. Guidelines (limits of disturbance or thresholds) have been set, beyond which we are reasonably certain that there will be long term losses in inherent productivity or hydrologic function. Guidelines have been set for soil disturbance (displacement, compaction, puddling), severely burned soil, ground cover, and above ground organic matter (litter, large woody debris) (FSH 2509.18).

Current erosion rates are well within soil loss tolerance thresholds. There has been little or no displacement or compaction in the area and ground cover and above ground organic matter is at or above optimum levels for the various soil types.

Cumulative Effects Area: The area included in the cumulative effects analysis for soils (long term soil productivity and on-site soil erosion) is the treatment area within the Pretty Tree Bench Analysis Area. Off-site impacts of sediment are discussed in the hydrology section of the NEPA document. Long term soil productivity is not affected by adjacent projects. Cumulative impacts to soil productivity are the result of additional projects on the same piece of ground, i.e. additional soil erosion, increased compaction, displacement, etc. Previous projects on any of the proposed treatment areas are timber harvests of approximately 10 years ago more recently and prescribe burn activities under the LBS Vegetation Treatment Project . Ongoing LBS Vegetation Treatment Projects include pinyon juniper prescribe burning along Hells Backbone Road and aspen harvest in the Road 566 area. Soil quality standards include threshold values for amount of surface organic matter, soil erosion rate and amount of soil disturbance (Bayer 1996). Increased on-site soil erosion rates associated with timber harvest are typically expected to be near natural levels (Bayer 1996). Direct, indirect and cumulative effects from past and ongoing activities are within soils quality standards, and long term productivity is maintained, when unsuitable soils are excluded from management activities and mitigation measures are applied to offset impacts (Bayer 1996).

Unsuitable soils have been excluded through the planning process (LBS Vegetation Treatment Project), and mitigations have been implemented through prescribed burn and timber sale planning and administration.

3.6 WATERSHED

3.6.1 CLIMATE

Climate in the analysis area is characterized by hot, dry summers and cold, relatively moist winters. The average annual precipitation is 16-30 inches and annually varies considerably from the average. Over half of the precipitation falls as snow, primarily from frontal storms, from October to April. These storms are local in extent and rarely last more than a few hours. Snowmelt is the principle source of late spring and early summer runoff. Precipitation during May through September is produced by thunderstorms which move in from the south. These storms tend to be local in extent, rarely last more than a few hours and frequently produce local flooding.

Temperatures vary from 70 to 80 degrees F in the summer, to subzero levels in the winter. There is no certain freeze free period. High summer temperatures and low humidity result in high evaporation rates. Water which infiltrates and becomes stored in the ground is not subject to the evaporation, and becomes an important source of water during dry periods. Therefore, processes which facilitate groundwater supply and storage are important factors to consider during land management planning. In addition, high infiltration rates reduce erosion caused by overland flow, which may impact quality and soil productivity.

3.6.2 GEOLOGIC SETTING AND GEOMORPHIC PROCESSES

Elevations range from 6,600 to 10,200 feet in the watershed analysis area. The area is located at the south edge of the Aquarius Plateau, and has a predominantly southern aspect. The geologic history of the plateau includes glaciation during the late Pleistocene period when ice-caps repeatedly formed on plateau, covering most, and possibly all of it. The ice-melts which drained from the top, formed broad canyon-like troughs in the plateau sides. During the most extensive glaciation, the termini of these outlets reached down to altitudes as low as 6,600 feet (Flint et. al, 1958). This resulted in ancient landslides in portions of the area, most apparent on the northern and eastern sides.

3.6.3 ANALYSIS AREA AND DOWNSTREAM USES OF WATER

The watershed analysis area is drained by Sand and Boulder Creeks. The Watershed Analysis Area is bounded on the south by the national forest boundary and includes 85,060 acres within Sand Creek and Boulder Creek Watersheds (see Appendix 3, Map G, "Watershed Analysis Area"). The headwaters of both watersheds are located on the Boulder Top Plateau, north of the Project Area boundary.

Lake Creek, a tributary to Sand Creek, flows into Sand Creek 1.5 linear miles downstream of the south border of the analysis area. Sections of Lake Creek are ditches constructed to divert water from Sand Creek for irrigation and culinary use in Salt Gulch. Sweetwater Creek also supplies water to the Salt Gulch area for irrigation and is returned to Sand Creek downstream, outside the National Forest Boundary.

Boulder Creek is diverted via penstock (pipe) for use at the Garkane power plant, located north of the Town of Boulder. Water is returned into the stream channel via the lower hydroelectric power plant. Both Boulder Creek and Sand Creek are tributaries to the Escalante River.

3.6.3.1 WATER USE DESIGNATION:

The State of Utah Standards of Quality for Waters of the State (rev 2/94), designates the Escalante River from the confluence with Boulder Creek to it's headwaters (which includes the analysis area) as protected for secondary contact recreation, cold water fisheries (including "necessary organisms for the food chain"), and agricultural uses including irrigating crops and stock watering. The State's Water Quality Assessment to Congress 1996, reports that cold water fisheries are supported in the Escalante River and tributaries, recreational uses have not been assessed. The report states that agricultural uses are partially supported. The cause of water impairment is identified as dissolved solids due to natural causes (State of Utah, 1996).

There is a designated municipal watershed in the Boulder Creek Watershed. The area is not within the Pretty Tree Bench Project boundary.

Table 3.6.3.3

Watershed Analysis Area Summary: Vegetative Cover Type

Attribute *	Watershed		Analysis Area	
	Sand Creek	Boulder Creek	Sum	Percent of Whole
Aspen	3,530	6,073	9,603	11
Grassland	1,383	18,778	20,161	24
Mahogany	0	141	141	< 1
Mixed conifer	996	867	1,863	2
Oak	1,377	591	1,968	2
Pinyon/Juniper	11,814	5,286	17,100	20
Ponderosa Pine	6,312	5,076	11,388	13
Private	756	405	1,161	1
Rock	1,731	530	2,261	3
Sagebrush	923	1,042	1,965	2
Spruce/Fir	4,822	12,415	17,237	20
Water (lks/res.)	107	105	212	<1
Acre Sum	33,751	51,309	85,060	

* Vegetative data obtained from Site data within project boundary, and soil - vegetation correlation data outside project boundary.

3.6.4 WATERSHED CONDITION AND WATER QUALITY

Water quality in the analysis area is generally considered good. Sediment sources include roads, erosional areas caused by natural and management activities, stream channels, and natural upland sources. The Escalante River is on the State's 1998 303(d) list of streams identified as needing Total Maximum Daily Loads (TMDL) analysis. The specific pollutant is identified as sediment. The list comments that there is a high probability that the river will be changed to reflect different stream types and ecological differences. All approved project activities will comply with State of Utah Nonpoint Source Management Plan (State of Utah, 1989) and the State's Antidegradation Policy (State of Utah, 1994).

3.6.4.1 SAND CREEK WATERSHED

A portion of the analysis area was addressed in the Sand Creek Soil Stabilization Project. The project decision was signed in 1995, and is still in the process of being implemented. As part of the project, (in 1997) approximately 25 acres which were contributing excessive sediment to Sand Creek were restored. Treatment included treatment of 4 separate areas by shaping the landscape to stable slopes, seeding, applying erosion mat where needed. Approximately 75 acres around the treated areas were fenced to exclude livestock. The areas are identified on App. 3 Map M. The effect of the treatment has been a decrease in the sediment contribution to Sand Creek from the rehabilitated and fenced areas. Also as part of the decision, road 566 was reconstructed including installation of broad based dips for improved roadbed drainage, and gravel surfacing, and relocation near Donkey Lake. This action has reduced impacts to adjacent meadows and Donkey Lake. Within the watershed, however, there are still erosional areas which are contributing sediment to Sand Creek due to the natural characteristics of the landscape and, also management impacts. Specifically, in the area around McGath Lake, are gullies in the upper reaches of the Grimes Creek watershed. Watershed restoration is expected to limit the area's contribution of sediment to Sand Creek. Meadow areas are also contributing sediment due to roadbed erosion and poor vegetative cover. Forest Road 494 and Hell's Backbone Road are major contributors of sediment to Lake and Sand Creek respectively.

Reconnaissance of Sand Creek shows that as much as 75% of the substrate is sand particles. Forest Plan direction under Wildlife and Fish Resource Management, 6A, states that no more than 25% of the stream substrate should be covered by inorganic sediment less than 3.2 mm in size. Sand Creek exceeds this direction by as much as 50%. Examination of the reach of Sand Creek between the main road and the upper well pad reveals that a high percentage of sand is being introduced to the stream from the road drainages and from runoff from the oil well pads and road. These problems were addressed in the Sand Creek Soil Stabilization Document. Sedimentation problems within Sand Creek can also be contributed to the seasonal diversion of upper Sand Creek for irrigation. Other perennial drainages in the PTB analysis area, including Lake Creek, appear to be in compliance with Forest Plan direction (LBS environmental Analysis, 1995).

Conditions are similar within the Sweetwater Creek watershed (a tributary to Sand Creek). Water quality and watershed conditions are generally good, however, there are management induced sources of sediment. When reconnaissance was done for this project there were eroding roadbeds and vegetation was sparse in meadow areas which are contributing sediment to the creek. The creek's riparian area is predominantly forested and, therefore, grazing pressure (and associated impacts) are limited.

Boulder Creek Watershed. Water quality and watershed conditions in the Boulder Creek watershed are generally good. A summary of a riparian inventory conducted in 1994 is presented in the next section. A major source of management induced sediment in the lower portion of the watershed is Forest Road 166, the road from Hwy. 12 to Road Draw road. There are areas of the eroding road cuts which are directly contributing sediment to Boulder Creek and Bear Creek (a tributary to Boulder Creek). Road Draw road also lacks adequate drainage and is contributing sediment. Another contributor of fine sediment is the landslide area in the Bear Creek watershed near it's confluence with Boulder Creek (T 32S. R 4E. Section 33); the landslide's outlet channel flows directly into the creek. In the section of the Boulder Creek subject to water withdrawal (from King's Pasture to the lower plant's outlet) riparian areas are necessarily less robust and sediment contribution is higher than what would be expected from natural streamflow conditions. Other management induced sources of sediment include sediment caused from grazing impacts in the meadow riparian areas adjacent to creeks in the watershed where channel stability and vegetative cover have been

reduced. The network of seasonal roads east of Sweetwater Creek area are also contributing some sediment to Boulder Creek via ephemeral and intermittent stream systems. The relative amount delivered to Boulder Creek is significantly less than those roads in close proximity to the perennial portions of the Creek previously mentioned.

3.6.4.2 RIPARIAN AREAS INFORMATION

Riparian Management Areas are generally designated within 100 feet of perennial streams, springs, seeps, and lakes. Riparian vegetation and seasonally saturated soils can be found at the edge of the lakes and ponds, and in wet meadows throughout the area and along perennial streams. Direction for Management Area 9A (Riparian Management) under the LRMP includes the goals of providing healthy self perpetuating plant communities, meet water quality standards, provide stable stream channels and still water shorelines. Within the analysis area the following streams have been designated as riparian management areas by the Forest Plan: Boulder Creek, East and West Fork of Boulder Creek, Bear Creek, Sweetwater Creek, Grimes Creek, Sand Creek, and a portion of Lake Creek. Watershed Critical Areas include Riparian Management Areas as described above and also include intermittent streams and wetland soils. These areas are identified on the Watershed Critical Areas map, App. 3, Map M; a 1:24,000 scale version of the map is also in the project file. These areas are subject to mitigations to be applied to riparian areas, as described in Chapter 2, section 2.4.2 of this document.

Level II Riparian inventories were conducted in East Boulder and Boulder Creek in 1994.

Boulder Creek Riparian Inventory Summary: The inventory included approximately 6.5 miles, from the Forest Service Boundary to the confluence of East and West Boulder Creek (from 6,600 to 7,900 feet in elevation). The stream was divided into 6 riparian complexes based on geomorphic and vegetative characteristics. The lower three reaches (about 4.9 miles) were found to have relatively high percentages of clay and silt in the channel substrate, varying from 20 to 30 percent, with 2 of the four rated at 25% and 30%. The percentage of streambank instability was rated at 30 and 20 percent in the lowest two complexes (about 2.9 miles), respectively; however, there were no land use activities identified as causing the instability, (Dixie National Forest, 1994). The LRMP limit for fine sediment in stream channels is 25% and the limit for channel instability is 50%.

East Boulder Creek Riparian Inventory Summary: The inventory included approximately 6 miles, from the confluence of West Boulder Creek upstream to just below the Boulder Top escarpment (from 7,900 to 9,900 feet in elevation). The inventory identified 10 riparian complexes. The lower three complexes were described as PNC (Potential Natural Community) seral status, the next one as late, and the upper two complexes as mid seral status. The stream is stable; 8 of the 10 complexes identified stream bank instability at 0%. The other two rated at 7% and 10%. The upper complex, the East Boulder Creek Upper Meadow, identified 70% fines in the stream channel substrate.

Overall, the inventory indicates that the stream is in stable condition. The upper meadow, although impacted by grazing, is a low gradient stream (0.5 %) through a fine-loamy alluvial soils. This makes it unlikely that the LRMP standard of less than 25% fines in the substrate is attainable. The lower East Fork is also impacted by water withdrawal for the Garkane hydroelectric plant, which limits it's use as a fishery in the lower 3.7 miles of East Boulder Creek, (Dixie National Forest, 1994).

3.6.4.3 WATER QUALITY MONITORING

Water Quality monitoring has been performed on Lake Creek Ditch and East Fork Boulder Creek during 1996. The sampling included macro invertebrate sampling on the East Fork Boulder Creek upper meadow (just below the Boulder Top escarpment) and Lake Creek approximately 1/2 mile above Hell's Backbone Road. The Boulder Creek site scored a Biological Condition Index (BCI) of 81, indicating the stream was in good condition. None of the chemical parameters exceeded State water quality standards. The Lake Creek Ditch site scored a (BCI) of 75, indicating the stream was in fair condition. None of the chemical parameters exceeded State water quality standards (Dixie National Forest, 1997).

3.7 FISHERIES

3.7.1 MANAGEMENT INDICATOR SPECIES

The National Forest Management Act of 1976 required that National Forests select species which serve as indicators for other species in evaluating the effects of alternatives considered and selected for the Forests' Land Resources and Management Plans (LRMP). These selected species, or groups of species, are known as Management Indicator Species (MIS). For the aquatic habitats, trout and aquatic macroinvertebrates were selected in the Dixie National Forest's LRMP and are the MISs which would occur in the aquatic habitats within the analysis area. Both are discussed in the Fisheries section below.

3.7.2 FISHERIES

Most of the watercourses within the project analysis area are ephemeral and flow only during periods of snowmelt or subsequential rainfall events. The principal perennial fish bearing streams associated with the analysis area lie along the eastern and western boundaries of the area. Boulder Creek is the perennial stream along the eastern boundary, and Sand Creek is the perennial stream along the western boundary. Each of these two streams have perennial tributaries which either wholly or partially lie within the analysis area.

A 1982 survey by the State Division of Wildlife Resources (DWR) found rainbow trout, brook trout, cutthroat trout and sculpin as the primary fishery in the Boulder Creek system at the confluence of the West and the East Forks. Riparian and instream habitat conditions were reported as good. Further downstream near the Forest boundary, only rainbow and sculpin were reported. The rainbow and brook trout are introduced non-native fishes and are known to compete with the cutthroat trout for habitat resources. Recent surveys by DWR found no native cutthroat trout in Boulder Creek below Baker Pasture (per.com. M.Ottenbacher, 12/98). Durfey Creek in the northwest corner of the analysis area has an artificially stocked population of Colorado cutthroat trout.

Bear Creek is a fish bearing tributary to Boulder Creek and lies within the northeast portion of the analysis area. The same reference indicated the presence of rainbow trout and whitefish near the confluence with Boulder Creek. The habitat was reported as good with numerous pools, good cover and no indication of sediment problems.

Per the same reference, Sand Creek is inhabited by a few rainbow x cutthroat hybrids below the confluence of Grimes Creek. Grimes Creek is located in the northwest portion of the analysis area and does not have recorded presence of fisheries. Per Ottenbacher 12/98, recent surveys detected no fishery in the middle reach of Sand Creek. At the lower end of Sand Creek, an abundant, self-

sustaining population of brown trout is reported by surveys conducted in 1989. Brown trout is an introduced, non-native fish. Beaver ponds in the lower end of the creek was attributed to sustaining the brown trout population.

Lake Creek Ditch is a combination of a creek and segments of an irrigation ditch which drains southward through the western portion of the analysis area, from McGath Lake. It contains a self-sustaining population of brook trout. McGath Lake is stocked with brook trout and is assumed to be the source of brook trout in Lake Creek. Per the same reference, the number of brook trout is reported to decrease toward the lower end of Lake Creek. That decrease is attributed to poor winter flows following the irrigation season.

See section 3.6.4.3 for aquatic macoinvertebrate information.

Cumulative Effects Area

The area of influence for the cumulative effects analysis is the watersheds of Sand Creek and Boulder Creek drainages. The analysis area lies totally within these two watersheds. Management activities and/or natural occurrences within these watersheds could present the potential for beneficially or adversely affecting the fisheries within the analysis area, whereas activities or natural occurrences outside these two watershed would likely have no potential to affect the fisheries within the analysis area or the larger watersheds of the Sand Creek and Boulder Creek drainages.

This cumulative effects area is the same as described in the WATERSHED section. The past, present and foreseeable future projects and their potential of effects to the aquatic systems are also the same as those described in the WATERSHED section. Specific fish bearing streams and one fish bearing lake, and one pond within the cumulative effects area outside the analysis area are: 1) the East Fork Boulder Creek located to the east of the analysis area, 2) the upper reach of the West Fork Boulder Creek, north of Baker Pasture, 3) Sand Creek south of the analysis area to the confluence with the Escalante River, 4) Boulder Creek south of the analysis area to the confluence with the Escalante River, 5) McGath Lake just outside the northwest corner of the analysis area, and 6) After bay pond at the upper hydroelectric power plant.

Fisheries of specific concern within the cumulative effects area consists of two self-sustaining populations of Colorado River cutthroat trout. This trout species is listed as a Sensitive Species by the Regional Forester of the Forest Service, Region-4. One population inhabits the upper reach of the West Fork Boulder Creek below the rim of Boulder Top Mountain. The other population inhabits the upper reach of the East Fork Boulder Creek below the rim of Boulder Top Mountain. These two populations are isolated from populations of non-native introduced fishes.

3.8 WILDLIFE

3.8.1 GENERAL HABITAT INFORMATION

United States Department of Agriculture's policy (FSM 2601.2) on wildlife, fish and plant habitat management pertinent to the National Forest System lands states that habitats for all existing native and desired non-native plants, fish, and wildlife species will be managed to maintain at least viable populations of such species. In achieving this objective, habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range. The earlier discussion in Section 3.1.1 Forest Ecosystems describing the

properly functioning conditions for the various vegetation types and the discussion below for principal habitats indicate a need to provide a diversity of habitat conditions, which in turn would provide a greater diversity of plant and wildlife species, which evolved with such habitat conditions. Ecosystems are in a properly functioning condition when, at any temporal or spatial scale, they are dynamic and resilient to perturbations to structure, composition, and processes of their biological or physical components.

Properly functioning condition seeks to ensure that all ecosystem structures and elements are provided for somewhere within each landscape (spatial), at all times (temporal), and are in a balance mix (e.g. "boom and bust" cycles are reduced). This helps to ensure that all ecosystem elements are present and functioning.

A basic assumption for maintaining biological diversity in a forested landscape is to have a diverse array of stands and thus a diverse array of ecosystems and their constituent species (Hunter, 1990). A generally accepted axiom states that as plant diversity increases wildlife diversity increases (Dobler, 1994). And, a guiding premise for sustaining ecosystems and protecting biodiversity now and into the future is to manage ecosystems such that their structure, composition and function of all elements; including their frequency, distribution, and natural extinction, are conserved. Conservation focuses on maintaining and restoring suitable amounts of representative habitats over the landscape and through time (Kaufman et al. 1994). The primary assumption is that if vegetative communities and their processes are similar today to those occurring historically, then if conditions approximate those under which species evolved, then, presumably, the full complement of species will persist (USDA-Forest Service. 10/1999).

The analysis area consists of approximately 53 square miles. Within this area, the principal wildlife habitats coincide with the vegetation zones described in the VEGETATION section. The aspen zone reflects the aspen forest habitat, the mixed conifer zone being mixed conifer forest habitat, the ponderosa pine zone being ponderosa pine forest habitat, the pinyon-juniper zone being pinyon-juniper habitat, the oak zone being oak habitat, and the sagebrush zone being sagebrush habitat. These habitats comprise about 90% of the analysis area. The remaining 10% of the analysis area consists of habitats comprising private lands that are mostly residential and cultivated pastures (about 1160 acres), rock outcrops and cliffs (about 885 acres), grass meadows (about 730 acres), spruce/fir forest (about 535 acres), a scattering of mountain mahogany, mixed mostly with the pine, and about 9 acres of aquatic habitat.

Excluding the rocks, aquatic, and private cultivated lands, processes which naturally maintain these habitats as a healthy ecosystem included disturbances by fire, insects and wind, with fire having been the dominate natural process. These processes provided a dynamic pattern of seral stages and structure to the vegetative habitats, as early forest and brush seedlings, open sparsely-stocked forests with brush, forbs and grass components, mature densely-stocked forest, etc.

The analysis area on the south slope of Aquarius Plateau, changes in one vegetation dominance over another are view as resulting from pattern, intensities and frequencies of the more dynamic processes, as fire, insects and wind. Climate change may augment or diminish the effects of these three processes.

Whenever a disturbance process takes place, the suitability of habitat is altered for some species that are habitat specific and benefit other species adaptable to the new habitat condition. Sustaining a viable population of habitat specific species on a given landscape depends largely on retaining or providing after a disturbance an adequate amount of suitable habitat distributed on the landscape.

Species that are generalists in using a variety of habitats and habitat conditions normally incorporate the change into their life needs or utilize other habitats at will.

Of the different disturbance processes, fire generally had the greatest effect on most wildlife species that utilize the various habitats within this analysis area. However, fires varied widely in extent, intensity, duration, and across temporal scales, and the effects on habitat conditions and associated wildlife species also varied widely. For example; A low-intensity ground fire which removes for a short period of time most of the forb and grass cover, would adversely affect ground-nesting and seed/fruit foraging species. Though detrimental in the short-term for some species, a low-intensity surface fire would be beneficial in the long-term by stimulating a flush of new and more vigorous growth of ground cover vegetation. Certain species, as the chipping sparrow which favor low brush-density and sparse ground cover, would benefit during the initial years after such fire until brush and other high vegetation gain dominance on the site. Low-intensity surface fires often burn in a mosaic pattern, leaving patches of unburned vegetation which sustain some of the wildlife species that are dependent on the ground vegetation. At the other extreme; a high intensity fire which kills a large stand of forest trees would be detrimental to songbirds which forage in the forest canopy, while being very beneficial to birds, as woodpeckers, which forage on insects that are drawn to dead trees. This scenario is even short-term, as the dead trees eventually fall, and the new growth of tree seedlings, brush and forb vegetation provides ideal habitat for grouse, cottontail rabbits, and certain songbirds which nest and forage in the young seral-age of the forest habitat.

Prior to the fire suppression era, natural disturbances provided a wide array of seral and structural form in the habitats, to which a wide array of wildlife species would have been accommodated, with many wildlife species requiring or preferring different habitat characteristics. As the disturbance processes maintained different wildlife habitat characteristics, the processes also benefitted plant species. Many of the species depend on disturbances for seed germination through renewed availability of sunlight and reduced successional competition. This in turn maintained the diversity and viability of native plant species, and the wildlife species associated with a diversity of plant species and diversity in the different seral age-classes of the habitats. Since the early-to-mid 1900's, effective fire exclusion has prevented fire from playing its historical role of maintaining and regenerating many of the forests of Utah (Graham, et al. 1999), which is typified in the analysis area.

The principal habitats (aspen, mixed conifer, ponderosa pine, pinyon-juniper, oak, and sagebrush) are each outside a natural regime in either acreage on the landscape, in distribution and composition of seral age classes, and/or to structural composition, due mainly to suppression of the fire disturbance processes and past management actions (VEGETATION section). The aspen, the mixed conifers, the pinyon-juniper, the oak, and the sagebrush habitats are predominately in mid to late-seral age conditions, with only minor percentages available of each in early and/or mid-seral age conditions to maintain wildlife and plant species associated with the early seral-age condition. The ponderosa pine habitat is in a mid age (+/- 70 yrs) class, with relatively uniform structure and moderate to high canopy closure.

Aspen Habitat - This aspen habitat comprises about 3,366 acres; roughly 10% of the analysis area. As a hardwood forest, aspen provide important habitat for many wildlife species, in the form of food and cover. Prior to the reduction in fire frequency, fires of usually small acreages maintained a mosaic of age classes and structural components, ranging from pure, mature aspen stands to mature aspen mixed with encroaching conifers, to young early seral age-class of aspen.

With the reduction in fire frequency and lack of any large scale management treatments, the aspen habitat currently consist predominately of mature and late-seral age stands and with an increasing high percentage of conifer encroachment, as (described in the VEGETATION section). This aspen

habitat condition is a result of the successional process in the absence of natural disturbance, such as fire.

Aspen forests provide important habitat for many species of wildlife, especially in the West. The diversity and species of birds in the aspen ecosystem in western North America reflects the variation in this ecosystem over a wide geographic area, as well as the variety of understory types, elevational zones, and associated tree species within the aspen type locally (DeByle, 1975). As a general rule, mature to old age-class stands of pure aspen are favored by hardwood-associated birds, as the American robin, warbling vireo and orange-crowned warbler. Mature to old age-class stands of pure conifers are generally favored by conifer-associated birds, as the pygmy nuthatch and Townsend's solitaire. A stand of mature aspen with a component of conifers generally accommodate a higher diversity of birds, than a stand of pure aspen or of pure conifers, by providing a diversity of niches (DeByle, 1975). Birds of mixed conifer-aspen would include the dark-eyed junco, yellow-rumped warbler and red-breasted nuthatch.

Many of the bird species which utilize the mid to late-seral aspen habitat conditions, including aspen with component of conifers, are tree cavity nesters and insectivorus birds that utilize the canopy for gleaning insects from the foliage and/or in flight. Some birds which prefer the younger aged aspen, which often resemble brushy habitat, would be the song sparrow, Bewick's wren and dusky flycartcher. The younger-aged stands of aspen commonly have a larger variety and abundance of early-seral vegetation, as grasses and forbs, which also provide a greater array of insects for birds to feed on, as well as an abundance of buds for winter forage. Opportunistic species, as bears and elk, commonly utilize the younger-aged aspen condition for forage, particularly the young twigs and leaves along with the higher abundance of grasses and forbs, and the older-aged aspen conditions mostly for cover.

Under the LBS VEGETATION TREATMENT PROJECT, recent management within this aspen habitat prescribed 160 acres (5%) of aspen habitat for conversion to young seral-age; 32 acres of patch cuts and 128 acres of burning. Under a natural regime, approximately one-third or more of the aspen habitat would be in an early seral age-class. The younger seral aspen habitat is important habitat for many wildlife species. Grouse, deer and elk utilize this seral stage for cover and food resource of the aspen twigs and buds. Various songbirds rely on dense ground cover for nesting and food resources of insects and understory plants found in young aspen stands.

Wildlife habitat management concerns in the aspen habitat relate to two factors. First, the lack of sufficient percentage of young age-class aspen and distribution for maintaining wildlife species associated with the various age-classes of aspen presently and into the future. Secondly, the potential for loosing large acreages of aspen habitat to successional encroachment of conifers.

Mixed Conifer Habitat - This habitat comprises roughly 3% of the analysis area. Before the era of fire suppression, natural stands of this habitat included a variety of conditions depending on the time since and the severity of the most recent burn (USDA, 1997). This habitat had the highest diversity in structure and mix of tree species, and, consequently, a high diversity of wildlife species. Diversity of conditions included stands of ponderosa pine/Douglas-fir regeneration, older open stands of large defective Douglas-fir trees with shrub, forb and grass understory components, dense stands of pole-size trees, stands of mixed species, and interspersion of natural meadows.

Current conditions in previously unharvested areas resemble the mature ponderosa pine/Douglas-fir habitat, with a mix of Douglas-fir tree sizes and species. There is a higher than natural component of true fir understory, due to infrequency of understory fires. Previously treated areas have a high

accumulation of fuels. These conditions suppresses the habitat's suitability for many wildlife species that relies on understory shrubs and forb vegetation.

Wildlife most associated with this current habitat condition include species which utilize trees and tree cavities for nesting and shelter. These include woodpeckers, owls, and squirrels. Songbirds such as flycatchers and vireos forage in the forest canopy. Elk and turkey also tend to favor this habitat, with the forage still provided in the interspersed meadows.

Wildlife habitat management concerns with current habitat conditions relate to two factors. First, habitat conditions of open mature forest with shrub and forb understory is generally lacking or at a low percentage compared to historical times. Affected wildlife which prefer and depend on this type of understory habitat condition for food and cover would be turkey, deer, elk, reptiles and amphibians. Secondly, the high fuel loading and the understory of young true firs, which serves as ladder fuels during an uncontrolled wildfire, presents a hazard for a potentially large and intense wildfire. This could eliminate much of the mature-forest overstory habitat that is utilized by the tree nesting and foraging species.

Ponderosa Pine Habitat - This habitat comprises roughly 22% of the analysis area. The ponderosa pine habitat today differ from the ponderosa pine habitat that existed before European settlement and the onset of fire suppression and increased ungulate grazing. Pre-settlement, periodic fires maintained a generally open pine forest habitat, with a high abundance of large trees and an understory dominated with forb and grass vegetation as ground cover. Various age-classes of brush vegetation, like bitterbrush on northerly slopes, manzanita generally on southerly slopes, and various age-classes of mountain mahogany and Gambel oak, distributed in patches also exists. Woody debris on the forest floor and large snags were generally low in abundance. The abundance of forb and grass understory was attributed to the availability of sunlight in the open forest canopy, growth stimuli and nutrient recycling derived from the periodic burning, and availability of soil moisture due the low stocking of trees.

Though the pine forest was generally an open pine-savanna habitat, (with variable patchiness of densely stocked pine); small areas within the forest stand periodically escaped underburning and provided diversity of habitat structural characteristic with denser stocking of understory trees. These patches commonly incurred a total burn at a later fire occurrence, adding small forest openings to the overall structural diversity within the pine habitat.

The relative high abundance of large trees, many defective with broken tops, provided for breeding populations of birds as the violet-green swallows, brown creepers, house wrens, pygmy nuthatches and northern flickers. The forb, grass and brush understory provided cover and forage for ground-nesting and ground-foraging species, as juncos, towhees, sparrows, thrushes, and for small mammals, as rodents and shrews, and provided forage for larger species, as bears, deer, bobcats and elk.

During the early 1900's, a combination of heavy sheep grazing, a period of relatively good moisture precipitation, and the reduction in fire frequency promoted survival of denser stocking of pine seedlings underneath the mature pine overstory, leading to current high stocking density. During the 1980's, harvest treatment was prescribed to reduce the spread of a beetle epidemic. Where topography permitted, this treatment removed most of the large overstory trees and thinned the young understory pines to reduce the competitive stress of overstocking. About 59 acres of early seral age pine is planned for group selection harvests , as prescribed in the LBS VEGETATION TREATMENT PROJECT. Where topography restricted earlier treatments, old growth pine forest

remains and accounts for a minor part of the pine habitat. This old growth is mostly distributed to the steeper topography.

The current pine habitat condition predominately consists of mid-aged pine with an understory of old-aged bitterbrush, manzanita and distribution of mountain mahogany and oak. Though thinned to reduce stocking density, the current density in many locations still provides a canopy closure which reduces sunlight to the forest floor for. The distribution of these retained trees, lack horizontal diversity in the structure, as varied spacing promoting patchiness in the form of clumps of trees and in openness. The slash left from harvest thinning in the mid-age pine and the lack of fire frequency in the old growth present a high accumulation of woody debris in the majority of the pine habitat.

Wildlife species utilizing the mid-aged pine stands are typically generalist species, which can utilize a wide array of habitat conditions. Deer and elk utilize this habitat conditions mostly for thermal cover and some foraging of bitterbrush. Various raptors utilize the area for foraging, though foraging suitability for raptors would be low due to low prey availability. The denser stocking, with a canopy closure providing less sunlight to the forest floor, and the lack of stimuli by fire contribute to a sparseness of forb and grass ground cover as compared to a natural pine forest of pre-settlement era. With that reduced abundance and vigor of the forb and grass understory, a corresponding sparseness in wildlife species associated with such ground cover can be expected. Brush and shrub species persist in mature form, though with less vigor in growth and fruit production, which contribute to less forage nutrition for wildlife species.

Wildlife habitat management concerns with current habitat conditions relate to three factors. First, the general lack of diversity in the mid-age pine stands. The uniformity of the thinned pine stands lack structural components as large trees, occasional large snags, horizontal diversity in structure, as tree spacings and openness. Secondly, the high abundance of older age-classes of brush and shrub species provide the majority of the forage and the understory habitat condition vs a component of healthy young age-class forage and diversity of understory plants. The reduced availability of sunlight due to overstory canopy and the lack of fire stimuli for promoting vigorous native forb and grass components to the habitat contribute to the current understory condition. Thirdly, the high fuel loading in both the thinned stands and the old growth stands presents a hazard for a potentially large and intense wildfire occurrence. Such occurrence could result in substantial loss of the old growth stands and of the mid-age stands. Consequently, the potential to manage these mid-age stands toward a diverse pine forest habitat into the future would be lost, and the potential to promote and sustain wildlife species which evolved within the natural ponderosa pine habitat would be lost as well.

Pinyon-Juniper Habitat - The pinyon-juniper habitat consists of roughly 45% of the analysis area. Before early European settlement, dense pinyon-juniper habitat composed mostly of large trees were often restricted to rocky areas with dissected topography. Large trees may have also occurred in adjacent sites, and in open savanna-like stands (Bunting, 1994). The pinyon-juniper habitat has expanded in land coverage and density throughout the intermountain west during the past century, and may have exceeded its historic distribution and density by as much as 60 percent.

This 15,060 acres of pinyon-juniper habitat is likewise an expansion within the analysis area from pre-settlement era, as evident from age-class distribution. Areas that were once maintained in a savanna like condition show increased occupancy and density of younger pinyon-junipers. From earlier photos, the stocking density of established stands has notably increased, resulting in greater canopy closure over the surrounding brush, forb and grass understory. Recent implementation of LBS burn project provided about 100 acres of reduced pinyon-juniper density and increased forage and habitat mosaic for wildlife.

The increasing pinyon-juniper canopy closure results in a reduction in productivity and species diversity of understory vegetation (Naillon, et al. 1999; Willis and Miller, 1999). With this reduction in understory component, loss of big game habitat occurs as a result of reduced forage, and the general wildlife numbers and species richness associated with a diversity of understory vegetation are reduced on acreages of dense pinyon-juniper (Willis and Miller, 1999). The encroachment of this pinyon-juniper habitat into other vegetation types, as into the sagebrush habitat, has resulted in reduced acreages of those other habitats. Species, both wildlife and plants, which are detrimentally affected by this change in habitat are those associated with the other habitats being encroached by the pinyon-juniper, particularly in the sagebrush habitat.

Some wildlife species associated with pinyon-juniper habitat and which benefit in population growth from the expansion of this habitat are the pinyon jay, gray flycatcher, black-throated gray warbler, and pinõn mouse. Dense stands of pinyon-juniper also serves as winter thermal cover for many species, notably deer and elk. Sparse stands of pinyon-juniper with brush, forb and grass understory serve as suitable winter range, providing forage along with concealing cover.

Wildlife habitat management concerns with the current conditions relate to two factors. First, the expansion of pinyon-juniper habitat and the increased stocking density in previously savanna like stands reduce the acreages of other habitats, most notably the sagebrush habit. The corresponding results are a reduction in populations of the wildlife species associated with those other habitats, as sage sparrows, brewer's sparrows, and a reduction in available forage on deer and elk winter range. Secondly, through increasing density of and canopy closure of pinyon pines and junipers in well established stands over large acreages, the diversity and abundance of brush, shrubs, grasses and forb vegetation are being reduced on those sites. The risk of loosing the on-site seed sources of the understory vegetation increases as the dense pinyon-juniper habitat persists over time, with potential loss of plant and wildlife species diversity on those sites.

Oak Habitat - Oak habitat consists of roughly 5-6% of the analysis area. Oak is a hardwood species which readily re-sprout after a crown-killing fire, offering rapid growth and foliage production with high nutritional quality. Prior to European settlement, frequent fires promoted a variety of age-classes within this habitat, and hindered the encroachment of trees, as pine and pinyon-juniper, which could overtop and reduce sunlight to the oak.

As with aspen, oak is a hardwood species which is very important to many wildlife species. The acorn mast provide valuable nutrition to species, as deer, turkey, and bear, particularly when the wildlife are preparing for winter. Leaves and twigs are also valued as nutritional food for many species, as deer and elk, especially during spring growth. Recent summer branch-growth, in turn, provides important winter forage for deer and elk. Winter buds provides food for many birds, as grouse and turkey. High insect abundance associated with hardwoods provide important food source for insectivores songbirds, lizards, amphibians, and small mammals, which in turn serve as prey for higher predators, as foxes, bobcats, and raptors.

The current oak habitat is predominately in a mature age-class and incurring encroachment from conifer trees, mostly ponderosa pine and pinyon-juniper. Mature-aged oak, especially with shading from overtopping conifers, looses its vigor and offer less food resources for wildlife species.

Wildlife habitat management concerns with current conditions relate to two factors. The first pertains to future health of the oak habitat and its future persistence in the landscape. As the oak continues to age and be over-shadowed by conifers, loss of the plant's vigor can be expected and its ability to vigorously re-sprout sufficiently to sustain wildlife use, as browsing, after a fire in the future

might be lessened, depending on time, scale and intensity of a future fire occurrence. The longer the time frame before a fire occurrence, the more fire resistance and persistent the encroaching pines become. Secondly, current production as a forage source for wildlife is lessened as the oak continues to mature and become over-shadowed by conifers.

Sagebrush Habitat - The sagebrush habitat consists of about 1,540 acres; roughly 5% of the analysis area. Prior to European settlement, periodic fires maintained a variety of age-classes and set-back the encroachments of young trees, as pinyons, junipers and ponderosa pine. Factors as topography, soils, aspect and fire patterns and intensities provided a complex, heterogenous habitat, with the percentage of and composition of shrubs, grasses, and forb vegetation varying with the percentage of sagebrush age-classes and density. This heterogenous habitat provided for a diversity of plant species and provided a multitude of habitat niches which supported a complex guild of wildlife species within the sagebrush habitat community.

Wildlife species' adaptations to the sagebrush habitat often vary between species, and even conflict between some species. Factors like the percentage of sagebrush canopy cover can influence suitability of a site for different songbirds, as the sage sparrow being adapted to high canopy cover, while the Brewer's sparrow is adapted to a sparse sagebrush canopy cover. Seasonal use and dependency of the habitat's heterogeneity vary for many species. Sage grouse use sites with dense sagebrush cover for winter survival and for protection from predators, while relying on sparser canopy sites for mating purposes and for chicks' dependency on grasses and forbs vegetation and insects as food resources. No sage grouse have been observed within the analysis area.

Sagebrush habitat serves as an important winter foraging area for deer and elk. Within this habitat, sagebrush plants provide an important winter forage for elk, and particularly for deer. Sagebrush retains a high nutritional quality during winter, compared to many other forage species, and younger age-class of sagebrush provides higher nutritional quality than older plants. However, sagebrush contains volatile oils which are detrimental in high concentrations to microbes that aid forage digestion in the rumen of deer and elk. When feeding on sagebrush, deer and elk require diets that include additional forage species.

The current sagebrush habitat is predominately in a mature seral-stage and has a higher percentage of sagebrush canopy cover than natural range of variability and a lower abundance of other vegetation, as grasses and forbs. Livestock grazing and exclusion of fire are viewed as the causes for this change in condition from the natural range of variability.

The sagebrush habitat is also loosing acreage to the encroachment of the pinyon-juniper habitat. With recognition that vegetation habitats naturally expanded and contracted in acreages, the loss of sagebrush habitat acreage within this analysis area due to reduced frequency of fire across the area is apparent. Though the specific acreage of sagebrush habitat loss due to fire suppression may not be known. Both ponderosa pine and pinyon-juniper habitats are the most obvious vegetation habitats that have encroached into and displaced sagebrush habitat. With pinyon-juniper habitat being the primary vegetation habitat that has encroached within the sagebrush, and using the considered 60% expansion of pinyon-juniper habitat in the intermountain west since European settlement and the era of fire suppression, the sagebrush habitat acreage lost to pinyon-juniper due to fire suppression could approach 9000 acres.

Wildlife habitat management concerns with current conditions are related to two factors. First, the sagebrush habitat has lost heterogeneity in age-class and a reduction in abundance and diversity of other plant species, resulting in lowered suitability for many plant and wildlife species, and possibly loss of suitability for some. Secondly, encroachment of pinyon-juniper continues to shade-out the

sagebrush habitat, including the diversity of other vegetational species. This encroachment reduces the acreage of the sagebrush habitat, and reducing population size of wildlife species adapted to and relying on the sagebrush habitat.

3.8.2 CURRENT OPEN ROAD DENSITY

The current open-road density is 1.26 miles/square mile, and is well within the Forest's Plan guideline of no greater than 2 miles of open-roads per square mile.

Within this analysis area, there are 66.8 miles of open roads currently being utilized by motorized vehicles. Several roads are closed from fall through spring. These closures are in the Sweetwater Creek area and in the Sand Creek - Lake Creek drainages. Both of the road closure areas lie primarily within the ponderosa pine habitat, which is one of the important wintering habitats for deer and elk.

Several objectives relate to these seasonal closures in relation to areas with open roads. Outside the hunt seasons, the seasonal closures provide areas of reduced disturbance during the winter months; disturbance normally caused by vehicular traffic. Winter months is a critical period of the year for wildlife to conserve body energy. During hunt seasons, a mix of hunting experiences is provided. Areas with open roads still provide hunters, who desire or require, the opportunity for easy vehicular access, while the areas closed to vehicular access provide other hunters with the opportunity for a non-motorized (walk-in) hunting experience. With the reduction in easy access, the seasonally closed roads provide areas within the pine habitat for reduced hunting pressure on wildlife, due to the reduced accessibility for hunters. The seasonal closures also reduce road damage, and related sedimentation to streams, which can be caused by vehicular traffic during wet winters.

3.8.3 MANAGEMENT INDICATOR SPECIES

The use of Management Indicator Species (MIS) is a method to evaluate the effects on viability of species populations by alternatives considered in formulating the Forest's Land and Resources Management Plan (LRMP), and is a method intended for use on a Forest-wide basis. Depending on type and scope, individual projects on Forest subunits, as Ranger Districts, might or might not contribute to the Forest-wide viability of species.

Management Indicator Species are selected because their populations changes are believed to indicate the effects of Forest Plan management activities on other species of selected major biological communities. Management Indicator Species are selected from the following categories: 1) Endangered or Threatened species, 2) Species with special habitat needs that may be influenced by planned management program, 3) Species commonly hunted, fished or trapped, 4) Non-game species of special interest, 5) Additional species whose population changes are believed to indicate the effects of management activities on other species... (CFR 219.19).

Wildlife Management Indicator Species selected for the LRMP and which inhabit or utilize the analysis area are:

SPECIES	VEGETATION HABITATS COMMONLY USED
Mule deer (*Odocoileus hemionus*)	Grass-forb, sagebrush, oak and brush, pinyon-juniper, aspen and conifer forests; all age-classes.

Rocky Mountain elk (*Cervus elephus*)	Grass-forb, sagebrush, oak and brush, pinyon-juniper, aspen and conifer forests; all age-classes.
Wild turkey (*Meleagris gallopava*)	Grass-forb, oak and brush, pinyon-juniper, aspen and conifer forests; all age-classes varying degree.
Northern flicker (*Colaptes auratus*)	Mature pinyon-juniper, aspen, conifer for nesting; mix of age-classes for foraging.
Northern goshawk (*Accipter gentilis*)	Mature aspen and conifer for nesting; mix of age-classes for foraging.

MULE DEER AND ELK

The designation of MIS for deer and elk relates to the emphasis of these species as game animals (commonly hunted), as well as for recreational viewing.

Mule deer and elk utilize all the vegetational habitats and all the successional age-classes of the habitats, for different functions, within the analysis area. The grass meadows, the sagebrush, the oak, and the younger age-classes of the forest habitats provide essential forage. The mid to mature age-classes of the forest habitats serve as hiding and thermal cover. The mature to old growth forest age-classes, including pinyon-juniper, provide thermal cover and some forage potential where understory persists, during both winter and summer. This use of multiple habitats, and multiple age-classes of the habitats, correlates with maintaining a diversity of habitats and habitat conditions, which in turn provides for a diversity of wildlife species.

The preferred ratio of forage to cover for deer and elk is 60% forage to 40% cover (Thomas, 1979). The current ratio of the analysis area is about 16% forage and 84% cover, considering all the vegetation habitats on National Forest System lands. The 16% is comprised of the sagebrush habitat, oak habitat, grass meadows, mountain mahogany habitat, 5% of the pinyon-juniper in savanna condition, and recent implementations of LBS Vegetation Treatments in the aspen, ponderosa pine and pinyon-juniper habitats.

The sagebrush (1542 ac), the oak (1861 ac) and the grass meadow (733 ac) habitats are considered "browse stands", which provide a continuum of big game forage over time. Within the past ten years, only about 50 acres of the oak has been treated to reinvigorate the forage quality condition. This 50 acres is only one percent of the total "browse stands" within the analysis area.

The majority of the pinyon-juniper and sagebrush habitats lies within a Dixie National Forest's Management Area - 5A (Big Game Winter Range, non-forest). The winter range (5A) is depicted on Map E in the Appendix. Management emphasis includes promotion of forage and habitat effectiveness during winter (Dixie N.F. Land and Resources Management Plan). The spread of pinyon-juniper and its vast majority of acreage in mid to older-aged stand condition have an effect of reducing the abundance and quality of available forage (herbaceous, shrub and brush species), which reduces the habitat effectiveness for forage on the winter range. The sagebrush habitat (roughly 1540 acres), the approximate 5 percent of the pinyon-juniper in savanna condition, and the LBS treatment of about 100 acres provide about 2400 acres of forage in the Management Area - 5A, or roughly 14 percent of the winter range. The 100 acres of pinyon-juniper treated under the LBS project were burned to reduce tree density, followed by seeding of native species to augment the future big game forage and habitat diversity for a variety of wildlife species.

The analysis area also lies within the Sub-unit #25-C Boulder elk herd unit and deer herd unit designated by the State of Utah Division of Wildlife Resources. The State Management Plans, for both elk and deer, acknowledge encroaching pinyon-juniper as a limiting factor in providing forage on winter ranges and recommend projects which would reverse the trend in this vegetation succession. Crop depredation by elk and deer is also identified as a limiting factor in meeting the unit management goal of balancing herds' impacts on private cultivated fields. The deer plan also identifies a concern with loss of aspen habitat by encroaching spruce-fir habitats.

Seasonal use of the analysis area by deer and elk are similar, with slight variations in areas of use. Both species use the mixed conifer, pine, oak, pinyon-juniper, and sagebrush habitats as principal winter range. The majority of the deer move to lower elevations than the elk do, utilizing the lower elevation of the pine and oak habitats and into the sagebrush and juniper-pinyon habitats. The elk tend to utilize the pine, oak, the mixed conifer habitats, and the upper elevation portion of the pinyon-juniper and sagebrush to a greater degree during winter.

The Salt Gulch area, with its lower elevation, is considered critical winter range during periods of heavy snow. As snow accumulates, both species will congregate to this lower elevation area and utilize to a greater degree the sagebrush and pinyon-juniper habitats around the Salt Gulch area to escape the snow and to search for forage. Presently, deer and elk are drawn to the greater abundance of palatable forage that exists in the cultivated pastures of the private lands, which leads to conflict with objectives of the local landowners.

As a herd animal, elk tend to spend a majority of their summer in the pine, oak, aspen, and mixed conifer habitats, and the interspersed meadows. Having a lesser tendency to form herds during the summer, the deer tend to spread across all the principal habitats. Deer fawning and elk calving occur across much of the pine, oak, mixed conifer and aspen habitats. Due to a higher percentage of use by deer and elk during fawning and calving seasons, the northwest portion of the analysis area is identified as important deer fawning and elk calving areas. This portion of the analysis area has a better distribution of available water, forage and cover. Calving and fawning can start around the end of May, with the majority occurring during the first part of June for elk and mid to latter part of June for deer.

As described in the GENERAL HABITAT CONDITIONS above, the existing condition of the forage ratio is substantially deficit in the aspen habitat, the mixed conifer habitat, the pine habitat, the pinyon-juniper habitat, with the majority of these habitats in mid to late age-classes. The mature oak habitat still provides essential forage, though in lesser abundance and nutritional value. The mature sagebrush, though edible by deer and elk, provides lower quality forage compared to younger age-classes and a diminished quantity of other forage species within the sagebrush habitat. A general lack of diversity within the different habitats provides for a lower diversity of other wildlife and plant species.

MERRIAM'S TURKEY

As a MIS designate, the turkey serves as a species of interest for viewing as well as for hunting.

Turkeys tend to favor the forested and oak habitats over the sagebrush and pinyon-juniper habitats during most of the year. Forested and oak habitats with interspersed small openings of grass meadows and young seral-aged aspen provide suitable foraging sites of grass, forbs, acorns and insects. Small forested opening and meadows provide suitable nesting sites. Large 'wolf' trees (trees with large lateral limbs) provide suitable roosting sites. During winters of heavy snow, turkey will

utilize the pinyon-juniper habitat along the interface with the pine and oak habitats, utilizing acorns, pine nuts, pinyon nut and juniper berries, along with other food sources, as rose hips and dried herbaceous plants. Though the pinyon-juniper habitat doesn't comprise a large proportion of turkey winter range; during severe winters and increasing snow depths at higher elevations, turkeys will venture farther into the pinyon-juniper and sagebrush habitats in search of food, with pinyon nuts and juniper berries becoming a critical food source. Use of pinyon-juniper habitat generally occurs within a mile of some availability of larger trees, as pines or cottonwoods, for roosting at night (Wakeling and Rogers, 1984). During late winter/early spring, as the snow line recedes, small openings in the pinyon-juniper habitat would provide the earliest available herbaceous vegetation for turkeys.

As mentioned in the GENERAL HABITAT INFORMATION section above, young age-classes of forest habitats is limited. Within the pine and the mixed conifer habitats, forage in the form of grasses and forb vegetation is minimal, as is in the mature aspen habitat. Suitable large roost trees are generally few in numbers in much of the mid-age pine stands, due to early removal of many of the large pines during the bark beetle infestation. The oak habitat is currently healthy, though with a trend of encroachment by pine and pinyon-juniper. Mature aspen is generally of limited use for turkeys, with minimal forage available as aspen encroachment occurs. Mature aspen also generally lack the suitable roost trees, and the density of trees often hinder escape flight. Acreage of young aspen, in the suckering stage with an abundance of understory vegetation and associated insects, is also limited in the analysis area. Small openings and available herbaceous forage for late winter/early spring use in the pinyon-juniper habitat are becoming limited with the current canopy densities and continuing trend toward larger acreages of mature pinyon-juniper and sagebrush.

NORTHERN FLICKER

The flicker has special habitat needs of large diameter dead and defective trees for cavity nesting and serves as a MIS for species known as secondary cavity nesters. There are species, like the bluebird, the flammulated owl, and squirrels, which rely on tree cavities for nesting and for shelter, but do not have the ability to excavate their own tree cavities. The flicker is a primary cavity excavator, meaning that the bird excavates its own cavity in a snag or suitable defective tree for its nest, and for winter shelter. As a primary excavator, the flicker usually excavates new cavities each year. Availability of snags, or suitable defective trees, is a nesting requirement for flickers. Diameter size of nesting trees is generally 12" or greater, though the flicker do excavate cavities in smaller diameter trees. Most excavations of smaller trees are used for shelter.

The presence of flickers utilizing an area for nesting indicates that the area should have sufficient trees with cavities to provide for secondary cavity nesters, since the flicker tend to create new cavities each year, leaving the tree cavities of previous years to the secondary cavity nesters. The northern flicker generally favor the mature conifers and aspen habitats, for the availability of snags and defective trees for nesting and for foraging. Utilization of dead and defective trees in areas remote from general forest habitats is also common. Pinyon-juniper habitat is generally used for foraging, though occasional large trees provide suitable nesting sites. The flicker is a generalist to a degree and will be found foraging in a mix of habitats and a mix of habitat conditions, including various age-classes, and nesting anywhere suitable trees for nesting might be found.

With the current condition of mature and older age-classes, the aspen habitat provides ample nesting habitat for flickers, and for secondary cavity nesters. The mixed conifer habitat, the portion of pine habitat that's of old growth condition, and the older established stand of pinyon-juniper habitat also provide suitable flicker nesting trees. Flickers are observed in all these habitats. The mid-age portion of the pine habitat provides limited number of snags of suitable size, and would be considered in

poor condition to provide for flickers and for secondary cavity nesters. A general lack in diversity of habitat conditions within the various principal habitats reduces the diversity of foraging conditions for the flicker and other cavity nesters, as the mountain bluebird which utilizes cavity trees for nesting but utilizes open, younger age-class habitat conditions for foraging. The general lack of young-aged forest conditions also limits the future recruitment of older age-class conditions, particularly in the aspen habitat as conifer encroachment continues.

NORTHERN GOSHAWK

The goshawk serves as a MIS for other wildlife species that are associated with mature and old growth forest habitats. The goshawk utilizes a wide variety of habitat conditions in many forest types to meet its nesting and foraging needs. Providing a variety of habitat conditions to sustain adequate goshawk needs in turn provides habitats for diversity of other wildlife species. The goshawk is also listed as a Sensitive species by the Regional Forester and is discussed further under Section 3.8.4.2 Sensitive Species; plants and animals.

3.8.4 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

3.8.4.1 THREATENED AND ENDANGERED SPECIES

The U.S.D.I.- Fish & Wildlife Service (F&WS) provides concurrence every six months on what T&E species are known or suspected to occur on the Dixie National Forest, with a breakdown by Ranger District. The northern bald eagle, the Mexican spotted owl, the Southwestern willow flycatcher, and the Utah prairie dog potentially could occur on the Escalante Ranger District. No threatened or endangered (T&E) animals or plants are known to inhabit the analysis area or close proximity around the analysis area.

The analysis area is not considered essential habitat for these species. The analysis area could be occasionally used for foraging or transversed in a dispersing mode by wide-ranging T&E species, as the American peregrine falcon, the northern bald eagle, or the Mexican spotted owl.

The **bald eagle** (*Haliaeetus leucocephalus*) utilizes large trees with heavy branching for locating for locating their nests, in proximity to large water bodies. McGath Lake, about 40 acres in size, lies adjacent the northwest boundary of the analysis area. The area is visited regularly during the eagle's nesting season by recreational fishermen and by Forest Service employees, including wildlife specialists surveying for T&E and sensitive species. Detection of eagle use in the area has not been recorded.

Mexican spotted owl (*Strix occidentalis mexicanus*) surveys were conducted in 1991 and 1992 in all the forested habitats within the analysis area, excluding pinyon-juniper which isn't suitable nesting habitat for this species. The surveys did not reveal any presence of the owl. Based on surveys across Utah, conclusion by the Forest Service and the F&WS determined that the owl's nesting habitat in Utah is restricted to steep-walled canyons.

This type of steep-walled canyon habitat exists within the lower portion of Sand Creek that forms the southwestern boundary of the analysis area within the Box-Death Hollow Wilderness. Surveys conducted in 1995 found no Mexican Spotted Owls. There has been one report of owl nestlings (species unknown) located in a small cave-ledge within the canyon portion of Sand Creek. This portion of Sand Creek is within the Box-Death Hollow Wilderness.

Southwestern willow flycatchers (Empidonax traillii extimus) utilize large patches of willow or similar habitat for nesting and foraging. Habitat of this type does not exist within or adjacent to the analysis area.

Utah prairie dogs (Cynomys parvidens) inhabit grass/forb and sagebrush/grass/forb habitats with deep soils and inhabits the John's Valley, north of Bryce Canyon and at the western boundary of the Escalante R.D. The habitat characteristics and the prairie dog are not found in or near the analysis area.

The **Ute ladies' tress orchid** (Spiranthes dilvuvialis), also known as Intermountain ladies' tresses, could potentially occur on the Tesadale R.D., to the north of the Escalante R.D., per concurrence with F&WS. This orchid inhabits moist sites, as wet meadows, streambanks, marshes, etc. Habitats of such characteristics within the analysis area were covered during surveys for T&E and Sensitive Species without detection of the plant.

Species Recently Removed From The T&E List And Species Presently Petitioned For Listing:
The **American peregrine falcon** (Falco peregrinus) was formerly listed as endangered under the Endangered Species Act of 1973, as amended. This falcon has been officially removed from the federal list of threatened and endangered species. Notice concerning the removal of the falcon from the threatened and endangered species list was published in the Federal Register by the USDI-Fish and Wildlife Service on August 25, 1999 (Federal Register: August 25, 1999; Volume 64, Number 164). This action removed the falcon from all protections provided by the Endangered Species Act. This action does not affect protection to this species provided by other federal and state laws and regulations.

No species currently Proposed for listing as Threatened or Endangered exist on the Forest. The **Bonneville cutthroat trout** (Oncorhynchus clarki utah) has been petitioned for Federal listing. This species does not inhabit the Colorado River drainages associated with the analysis area.

3.8.4.2 SENSITIVE SPECIES; PLANTS AND ANIMALS

Sensitive species are those species identified by the Regional Forester for which population viability is a concern, as evidence by:

a. Significant current or predicted downward trends in population numbers or density.
b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

General policy of the Forest Service is to avoid or minimize impacts to sensitive species, though does not preclude impacts to such species, if analysis indicates that impacts would not result in loss of species viability or create significant trends toward Federal listing (Forest Service Manual 2670.32).

Managers rarely have all the information needed to conduct a fully quantitative population viability analysis (PVA). In the face of missing demographic information, one practical alternative is to use inventories of the quantity, quality and distribution of suitable habitat as a surrogate for PVA. The primary assumption is that if vegetation communities and their processes are similar today to those occurring historically, then conditions approximate those under which species evolved. Presumably, therefore, the full complement of species will persist (USDA-Forest Service. October, 1999).

Life History of Endangered, Threatened, and Sensitive Species of the Dixie National Forest, revised March 1997 (available at the District Office and the and Forest's Headquarter Office) provides a listing of Sensitive Species known or suspected to occur on the Dixie N.F., and provides habitat characteristics and known distribution associated with the species. The habitat characteristics and distribution of Sensitive Species is used to determine whether such species would potentially occur within the analysis area on the Escalante R.D. Those Sensitive Species which potentially could occur in the analysis area are discussed below.

Spotted bats (Euderma maculatum) and **Western big-eared bats** (Plecotus townsendii), also known as Townsend's big-eared bat, are known to inhabit a variety of vegetation types from low desert to high mountain areas. Though these species are widespread, their population numbers are generally low throughout their range. Within the vegetative types occupied, these two bats depend on critical habitat features, notably roosting habitat, for their daily and seasonal life needs. Roosting habitat is often noted as a limiting factor for bats. Unlike bats common to the northern forests which often utilize old growth forests for roosting (Thomas, 1988; Crampton and Barclay, 1998), the spotted bat depend on structures such as rock crevices and caves (MacMahon, 1992; USDA-Forest Service, 1991; Leonard and Fenton, 1983; Kuenzi, et al, 1999). Old mine tunnels are also utilized as roost sites by both species. The western big-eared bat is more dependent on caves, and mine tunnels, for day roost than rock crevices. Old buildings have also been known to be used as night roost by the western big-eared bat (Barbour and Davis, 1969). Cliffs and rocky outcrops that could provide crevices for roosting by spotted bats are found along the western boundary of the analysis area, within the Sand Creek drainage and within the Box-Death Hollow Wilderness. Caves suitable for serving as day roost sites for the western big-eared bat and as winter hibernaculums for both bats are not known within the analysis area. The western big-eared bat is known to utilize trees during night foraging for resting and eating prey before returning to day roosts in caves (personal communication, Dan Garcia, USDA-Forest Service, 1999).

Spotted bats' favored foraging habitats include open areas, as fields, meadows, shrub habitat, forest clearings and similar habitats (Leonard and Fenton, 1983; Woodsworth, et al, 1981). The grass meadows and sagebrush habitat within the analysis area would be likely foraging areas for this bat. Soft bodies insects, as moths, are common prey items for the spotted bat. Western big-eared bats' favored foraging habitat are bodies of water that provide a high density of insects Likely foraging habitat within the analysis area for this bat would be the perennial creeks within and along the boundaries of the analysis area and the lakes along the northern boundary and outside the analysis area.

Management emphasis for these two bats is to avoid impact by management activities that could adversely impact essential habitats, as known hibernaculums and intensely-used foraging areas.

Northern goshawk (Accipter gentilis) was petitioned in 1997 for listing under the Endangered Species Act of 1973, as amended. In June 1998, the USDI-Fish and Wildlife Service determined that the northern goshawk did not warrant listing (Federal Register: June 29, 1998, Volume 63, Number 124).

In June 1998, an *Assessment of Habitat Conditions in Utah for the Northern Goshawk and Its prey* (Graham et al) was completed and was published in February of 1999. This assessment was a coarse assessment of the habitat conditions within the State of Utah. This assessment found that there is presently adequate nesting habitat to maintain a breeding population of goshawks, that presently there is available medium rated to better foraging habitat throughout the State, and that goshawks appear to be able to move freely among the habitat patches throughout the State. In addition, the assessment found that the habitat quality was declining in the State.

The assessment concludes that the most obvious habitat trend in Utah forests and woodlands is the lack of early and mid-seral species in all of the potential vegetation types. The forests and woodlands of Utah are dominated by late seral species. Depending on the potential vegetation type, white fir, subalpine fir, Douglas-fir, pinyon pine, and juniper often dominate the forests. In addition, most forests contain many seedlings and saplings, creating dense forests prone to insect, disease, and stand replacement fires. Forests dominated by late seral species in general are more unstable in both the short- and long-term than forests dominated be early and mid-seral species. In addition to being unstable and at risk to stand replacing fires because of dense stands with many canopy layers, these same conditions make them undesirable for both nesting and foraging by goshawks (Graham, et al. 1999).

Graham et al (1999) state that at the local level (forest level and lower) this assessment outlines a process that should be used to describe goshawk habitat, proper functioning condition, or other forest or woodland characteristics of interest. At this level, fine resolution data should be used to describe these characteristics, and the assessment of habitat in Utah can be used to provide context. As described in the section above on GENERAL HABITAT CONDITIONS and in the earlier section on VEGETATION, the habitat data, specifically the vegetation conditions, pertinent to this analysis area and surrounding cumulative effects area are presently not in a properly functioning condition and also reflects the State-wide assessment by Graham et al (1999).

Graham et al (1999) emphasized that their assessment does not prescribe implementation methods. It describes desired conditions, with managers needing to decide how and if they will be used. In addition, at the local level, the *Manangement Recommendations for the Northern Goshawk in the Southwestern United States* (Reynold et al. 1992) should be used to help prepare site prescriptions.

In October, 1998, a "*Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah*" (HCS) was approved and agreed to by the USDA-Forest Service (Region-4 Regional Forester), the USDI-Bureau of Land Management (Utah State Director), the Utah Division of Wildlife Resources (Director of Utah DWR), and the USDI-Fish and Wildlife Service (Utah Field Supervisor). The purpose of this habitat management strategy and agreement provides a management strategy for the Forest Service, Bureau of Land Management and the Utah Division of Wildlife Resources that will maintain adequate nesting and foraging goshawk habitat that is well connected throughout the State of Utah in order to sustain a viable population of goshawks. Also, managing habitat for the goshawk would in turn provide habitat for a large variety of avian and mammalian species associated with goshawks.

The HCS emphasizes that projects to implement Forest Plans in the conservation of Goshawks follow the Desired Habitat Conditions statements as layed out by the assessment of Graham et al (1999) for forested landscapes. In brief these are:

1. Promoting a strong representation of early seral tree species on the landscape.
2. Provide high quality habitat patches no more than 60 miles apart for habitat connectivity.
3. Have 40% of the forested landscape area dominated by large trees, well distributed.
4. Provide habitat for goshawk prey species and other associated species.
5. Provide a variety of structural stages as recommended by Reynolds et al (1992).

The HCS further specifies that during development of site specific prescriptions for projects the ecological principals and assessment process found within the management recommendations for the northern goshawk in the southwestern United States (Reynolds et al. 1992) should be used.

During the development of the recommendations by Reynolds et al in the late-1980's and early-1990's, solicitations were made to the State of Arizona, federal agencies and the scientific community for review and comments on the recommendations' applicability to the forest habitats in Region-3 of the Forest Service. Some respondents offered disagreements on some aspects of the recommendations, but general consensus was that the recommendations, if followed, would be an improvement to forest management practices at that time.

The Reynolds recommendations do not address all cover (vegetation) types, growth conditions, fire regimes, or historic vegetation patterns found in the State of Utah. Per the HCS, where site conditions differ, the administrative unit (i.e.- Forest or Field Office) must interpret and document their own specific values based on local data. These local data should be interpreted using the Reynolds et al 1992 habitat evaluation process. Two cover (vegetation) types existing in Utah and not addressed by Reynolds et al are the quaking aspen and the lodgepole types. The quaking aspen type is present within the analysis area of the proposed Pretty Tree Bench Vegetation Project; the lodgepole type is not.

In October of 1999, the Intermountain Region (Region-4) of the Forest Service, which the Dixie National Forest is a part of, published and provided for public comment an environmental assessment on a proposal to amend the land and resources management plans (forest plans) of the National Forests within the State of Utah. The environmental assessment is titled "*Utah Northern Goshawk Project Environmental Assessment*". All National Forests within the State of Utah currently have direction from the Regional Forester to draw on the intent of the Reynolds et al (1992) management recommendations for management of habitat for goshawk and its prey, as well as other pertinent scientific information. With the variations in forest plans of the different National Forests, current direction is not sufficient to provide consistency, resulting in a variety of interpretations on how to manage goshawk habitat.

The purpose of the proposed amendment to forest plans is to provide greater consistency in management directions among the National Forests in Utah for management of goshawk habitat until the various forest plans are revised. The environmental assessment addresses six alternatives, including the No Action Alternative. A decision on selection of an alternative is still pending. None of the alternatives, including the No Action Alternative, would result in the loss of goshawk population viability during the short time frame of the proposed amendment (page 2-22 of the Environmental Assessment). Each alternative varies in its ability to reduce risk to loss of habitat needed to support the currently population of goshawks in Utah, with the No Action Alternative providing the least reduction of risk and Alternative F providing the greatest reduction of risk. Though all alternatives, including the No Action (Alt. A), incorporate the intent of the Reynold et al management recommendations, alternatives B, C, D, E and F would provide further directions to gain consistency among the National Forests.

Along with the recommendations of Reynolds et al, all of the action alternatives incorporate the concept of Historic Range of Variation (HRV). The principal differences among the action alternatives, concerning vegetation treatments in goshawk habitats, are as follow:

ALTERNATIVE B: Allows design and implementation of actions that mimic historical range of variation (HRV), which includes permitting extreme large scale disturbance events.

ALTERNATIVE C: Allows design and implementation of actions that mimic HRV, but as defined by Properly Functioning Conditions (PFC), which precludes the extreme large scale disturbance events.

ALTERNATIVE D: Similar to Alternative C, but adds additional and more complexity in prescriptive direction, which would costs more in time and funds to implement.

ALTERNATIVE E: Allows design and implementation of actions that mimic HRV, including extreme large scale disturbance events. This alternative would also preclude treatments im-mature and old growth goshawk habitats.

ALTERNATIVE F: Allows design and implementation of actions that mimic HRC, but as defined by PFC. This is the only alternative which emphasizes that projects intended to promote and maintain goshawk habitat should focus on high and optimum habitats at the greatest risk of loss and emphasizes a treatment target of 1,000 acres per year per Forest management unit.

Habitat of the Northern Goshawk:
Goshawk nesting is associated with mature and/or old growth forest habitats. Nesting sites of goshawks in a forest generally include stands with large trees and relatively high tree canopy cover. Nest areas, with stands of large trees and high canopy closure, are generally located on northerly slopes in proximity to water, typically providing mild and stable microenvironments, offering greater protection from predators, and providing readily accessible source of water for recently post-fledged juveniles. Beyond the nest area, the forest habitat may be a mixture of tree sizes and spacing.

A post-fledging area surrounding the nest area is used by adults and juveniles from the time the young fledge until the young are no longer dependent on the adults for food. This post-fledging area generally includes a variety of forest conditions, with the majority of the forested habitat in a mature or older age class, with well developed mix of understory species, and habitat attributes essential to goshawk's prey species (Reynolds, 1992).

Goshawk foraging area comprises the largest portion of the goshawk home range. This area provides a diversity of landforms, forest habitats of varying age-classes and of vegetation types and structure. Foraging habitat includes younger forest age-classes and small forest openings, as meadows and recent harvest units, as well as the older age-class conditions. Snags, downed logs, small openings, large trees, herbaceous and shrub understories and diversity of vegetation structural-stages are important habitat attributes required to maintain sufficient and diverse prey base for goshawks (Reynolds, 1992).

In brief, a diversity of habitats, with diversity in age-classes and structural-stages, across the landscape provides not only the needed nesting and foraging conditions, but also provides a large array of wildlife species, many utilized as prey, and provides a continuum of suitable nesting and foraging conditions over time as the various age-classes progress in successional stages and younger earlier age-classes are created by disturbances. As described above in GENERAL HABITAT CONDITIONS, a diversity of habitats exist, as pine habitat, mixed conifer habitat, aspen habitat. However, a diversity of conditions within these habitats is generally lacking, notably a lack in diversity of age classes which would limit the diversity of prey species.

Habitat connectivity for goshawks within the analysis area is very good. The majority of the forested and pinyon-juniper habitats are of mature to older-aged conditions, and there are no barriers to free movement of goshawks within these habitats or from the analysis to the forested and pinyon-juniper habitats surrounding the analysis area. Assessment by Graham et al (1999) determined that connectivity is currently adequate for the State of Utah. The analysis area of the proposed Pretty Tree Bench Vegetation Project falls within the area covered by the larger State-wide assessment.

Through the mid and late 1990's, the suitable nesting habitats of the goshawk have been fully surveyed for presence of goshawk nesting areas. Nesting areas are monitored yearly after discovery to verify continued presence and nesting activities. Records indicate that two goshawk nest areas exist within the analysis area, and one nest area exist adjacent the analysis area. The two nest areas within the analysis area were discovered in 1992; both areas having successful nesting and fledging of young that year. One site has been active for two years afterwards without indications of successful nesting. In 1998, this site showed signs of nest repair, but no nesting attempt. Records for the second site indicate no goshawk nesting activity since 1992. The lone nest at this site continued in neglect over the years and was totally lost from the nest tree when monitored in 1998. Records indicate that the third nest area, that's just outside, but adjacent to the analysis area, was successful in fledging young in 1993, 1995 and 1996, with presence of adults in the vicinity during 1997, and no detection of goshawks in 1998.

Seasonal restrictions on potentially disturbing management activities are applied in the vicinity of known nest areas during the nesting season, until such time that the nesting season concludes or determination is made that the goshawks are not actively nesting. Any new nesting locations found before or during implementation of any disturbing projects would also receive protection.

Flammulated owl (Otus flammeolus) are generally associated with open mature/old growth ponderosa pine and mixed conifer habitats, which provide the availability of tree cavities for the owl's nesting. Aspen and fir trees may be used occasionally when such provide the availability of suitable nesting cavities. In such situations, the aspen and firs are generally mixed with or adjacent to pine habitat (Reynolds and Linkhart, 1992). As a secondary cavity nester, which do not excavate its own tree cavity, this owl relies on primary cavity nesters, as woodpeckers and flickers, to provide its nesting sites. This small owl is opportunistic in foraging on small prey, as mice, voles, young of ground-nesting birds, large insects, and probably an occasional amphibian and lizard.

Records indicate that flamulated owls are present in pine and mixed conifer habitats of the analysis area, as determined from this owl's vocal responses received during surveys for the Mexican spotted owl. Specific nest trees are not identified. Management practices for this species relate to ensuring, over time, the availability and distribution across the Forest of suitable snags and defective trees in forested habitats favored by this species.

The population range of the **Three-toed woodpecker** (Picoides tridactylus) extends throughout the boreal forests of North America and Euroasia. In North America, its range extends from the tree line in northwestern Alaska, across northern Canada, to Labrador on the Atlantic Coast. An arm of the range extends southward down the Rocky Mountains at higher elevations to northern Arizona and New Mexico, including the Colorado Plateau in which the analysis area lie. Though this woodpecker has an extensive range, mostly through the higher latitudes, its population numbers are generally low throughout its range.

The three-toed woodpecker is associated with coniferous and mixed hardwood/coniferous habitats. This woodpecker is a primary cavity excavator, usually excavating a new nest cavity each year. Snags and defective trees are used for cavity nesting. This woodpecker has a decided preference for spruce trees (Bock and Bock, 1974). Consequently, favored habitats include the spruce and spruce-fir forests, which are characterized with thin bark. Pines, mixed conifers and aspen which have thicker bark are less frequented, unless they are associated with spruce or of younger age with thinner bark. Three-toed woodpeckers are well known to respond opportunistically to insect outbreaks following fires in coniferous forests.

Recent study by Murphy and Lehnhausen (1998) indicates that this woodpecker's feeding behavior focuses predominately on pecking and flaking the tree bark to gain insect larvaes immediately under the bark of trees recently killed or weakened fire. Such larvaes would be of various bark beetles and the first-year instar larvae of wood-boring insects, as opposed to second and third-year instar larvaes of wood-boring insects found deeper in the boles of trees. Murphy and Lehnhausen further found that trees heavily scorched and killed immediately did not provide the suitable microhabitat for bark beetle larvaes, as opposed to trees killed by less intense fire and/or weakened by fire. The duration of bark beetle infestation at a given fire site is generally two to three years. Murphy and Lehnhausen also found that the number of three-toed woodpeckers in a fire area declined quickly following the decline of bark beetle infestation. After a bark beetle infestation declines, the three-toed woodpeckers disperse back into the live forest and rarely observed. In addition to trees infested by bark beetle larvaes due to recent fire, habitats of live spruce infested with the spruce bark beetle and windfall areas infested with bark beetle should also provide opportunistic foraging sites for this woodpecker (Bock and Bock, 1974). Though a spruce bark beetle infestation at a specific site might last only a couple of years, an infestation spreading over a much larger area may extend for many years as the beetles move across the landscape occupied by spruce.

Management practices for this species relate to ensuring, over time, the availability and distribution across the Forest of suitable snags and defective trees in forested habitats favored by this species.

Colorado cutthroat trout (Oncorhynchus clarki pleuriticus) is one of three subspecies of native cutthroat trout in Utah. Cutthroat trout are the only trout native to Utah, and the Colorado River cutthroat trout is native to drainages associated with this analysis area. The other two subspecies (Bonneville and Yellowstone) are native to other drainages of the state.

Populations of the Colorado River cutthroat trout (CRCT) may be lake resident, fluvial or adfluvial, and life history characteristics vary somewhat among these strategies. The CRCT spawns in the spring, usually when the spring floods begin to recede in late spring/early summer, and the fry emerges in late summer/early fall. Gravel substrate with good water circulation is used for spawning sites.

In or adjacent to the analysis area, the CRCT was known to inhabit the Sand Creek and the Boulder Creek drainage systems (per conv. DWR). Sand Creek forms most of the western boundary of the analysis area, and Boulder Creek forms most of the eastern boundary. Bear Creek is a fish-bearing tributary to Boulder Creek and lies within the analysis area. McGath Lake, a man-made reservoir located adjacent the northwest boundary of the analysis area and other natural lakes adjacent the northern boundary were not and are not presently inhabited by CRCT, due mainly to natural barriers.

Colorado River Cutthroat is not known to inhabit most of the streams or portions of streams within or bordering the analysis area. The likely reason attributed to the loss of CRCT is the introduction of non-native trout, which the CRCT do not appear to compete well with. Non-native trout, like brook trout, brown trout, and rainbow trout, have been introduced and are established in portions of Sand Creek and Boulder Creek are managed as a recreational fishery. The last report by Utah Division of Wildlife Resources of CRCT in Sand Creek indicated a hybridized population of rainbow X cutthroat in the upper reach of Sand Creek, below the confluence of Grimes Creek, a tributary (pers comm. DWR, 1998). This hybrid population may no longer exist. The closest populations of stainable CRCT are outside the analysis area, in the upper reaches of the West Fork and the East Fork of Boulder Creek, where barriers to stream passage have precluded or limited the non-native trouts.

Colorado River Cutthroat are known to inhabit only Durfey Creek within the analysis area, this occurs near Haws Pasture. This creek is a tributary to the West Fork of Boulder Creek. These CRCT were stocked in Durfey Creek about five years ago by the Utah State DWR. According to the DWR,

reproduction by these CRCT has not occurred, due to inadequate spawning habitat and/or water temperature being too cold. Consequently, the DWR does not consider this stocked population of CRCT as contributing to the objectives of the "Conservation Strategy" mentioned below.

The current management strategy for the CRCT is guided by the "*Conservation Agreement And Strategy For Colorado River Cutthroat Trout In The State Of Utah*", March 1997, which sets the objectives of restoring and maintaining conservation populations of CRCT and for eliminating or reducing threats to CRCT and its habitat to the greatest extent possible.

A proposal is currently made by the State DWR to re-establish CRCT in the lower portion of the West Fork of Boulder Creek. The State has determined this portion as suitable for re-establishing a population of this trout. This portion of the West Fork proposed for re-establishment of CRCT forms the northeast boundary of the analysis area.

The followings are Region-4 listed **sensitive plant species** located on the Escalante Ranger District, of which the majority of these are specific to habitat conditions outside the analysis area.

Dana milkvetch (*Astragalus henrimontanensis*)
Table Cliff milkvetch (*Astargalus limnocharis* var. *tabulaeous*)
Paradox Moonwort (*Botrychium paradoxum*)
Aquarius paintbrush (*Castilleja aquariensis*)
Reveal paintbrush (*Castilleja parvula* var. *revealii*)
Yellow-White catseye (*Crypthanta ochroleuca*)
Cedar Breaks biscuitroot (*Cymopterus minimus*)
Widtsoe buckwheat (*Erigonum aretioides*)
Jones goldenaster (*Heterotheca jonesii*)
Neese's peppergrass (*Lepidium montanum* var. *neeseae*)
Little penstemon (*Penstemon parvus*)
Podunk groundsel (*Senecio malmstenii*)
Maguire Campion (*Silene petersonii*)
Rock-Tansy (*Sphaeromeria capitata*)

Only the **Dana milkvetch** (*Astragalus henrimontanensis*) is located within the analysis area. This milkvetch is a perennial herb, a member of the pea family, and occurs in washouts and gravelly loam soil in mixed ponderosa pine, juniper, and sagebrush communities in areas between 7,000 and 9,200 feet elevation. This milkvetch flowers from April to May. Identified major threats and limitations to this species's habitat and population are 'reclamation' of vegetation, as chaining, windthrowing, and seeding with introduced non-native plants (Dixie National Forest, 1998).

Several small populations of this milkvetch are known within the analysis area. The locations of these small populations are along a small stream course and within the ponderosa pine habitat and transition area between the pine and oak habitats with component of bitterbrush, which suggests that this milkvetch evolved with periodic low intensity fire occurrences. However, little is known of its ecology in relation to fire. Particularly to time of year and intensity of fires.

Two sensitive plants are known to exist outside the analysis area but within close proximity. These are the Jone's goldenaster and the Neese's peppergrass. The **Jones' goldenaster** (*Heterotheca jonesii*) is a long-lived perennial herb of the sunflower family. This species occurs in ponderosa pine, manzanita, pinyon pine, oakbrush and Douglas-fir communities on Navajo sandstone. The plant grows in rocky and sandy sites where other vegetation is very sparse. The location known on the

Escalante R.D. is in a ponderosa pine and manzanita community approximately three-quarter of a mile west of the analysis area. No locations are known within the analysis area.

Neese's peppergrass (*Lepidium montanum* var. *neeseae*) is a perennial herb of the mustard family. This species occurs in dry, sandy sites, mostly open with little cover in ponderosa pine, manzanita, and spruce/fir plant communities mainly on the pink and white limestone members of the Wasatch Formation and also on the Navajo Sandstone Formations. Multiple locations of this species are recorded on the Escalante R.D. in and adjacent to the Box-Death Hollow Wilderness to the immediate west of the analysis area; none have been reported within the analysis area. Major threats identified for this species' habitat and populations are loss of essential habitat, as by road building or other major ground disturbing activities.

Sites which resemble the habitat characteristic of this species is limited within the analysis area and have been surveyed with no detection of this species.

3.8.5 WILDLIFE AND BOTANICAL DIVERSITY

3.8.5.1 GENERAL DIVERSITY PATTERN

With the general diversity of vegetation zones described in the VEGETATION section and correlating description of habitats in the GENERAL HABITAT INFORMATION above, the analysis area holds a diversed set of habitats for wildlife and plants, ranging from alpine to high desert sagebrush. As described earlier, the diversity within many of these vegetation zones, or wildlife habitats, lessens substantially from pre-European settlement times, with a general pattern of homogeneity in age-classes and structure (vertical and horizontal). Consequently, expected diversity of wildlife and plant species, namely forb and grass species, associated with young age-classes of the principal habitats would be proportionally low, compared to a natural regime where the habitats and associated species evolved with fire and other disturbances.

3.8.5.2 NON-NATIVE WILDLIFE AND PLANT SPECIES

The introduction of non-native species can add to diversity of species, in many instances, if introduced non-natives are compatible or complementary with native species and ecological function in an area. In other instances, species diversity can be lessened by reduction or elimination of certain natives species if introduced non-natives aggressively predates on, or compete for resources and site occupancy, or hybridize with native species. Other natives species, which may be obligates to a native species that might be displaced or eliminated by aggressive non-native species, could be adversely affected, also. This scenario would result in the loss of certain native insects that might be obligates to specific native plants adversely affected by non-native plants.

No non-native wildlife species are known in the analysis area and surrounding vicinity. The Rocky Mountain elk and the Merriam's turkey are considered re-introduced native species.

Non-native plants have been introduced on the NFS lands. Traditional practices in the past have been seeding disturbed grounds with mixtures of various seed species, often including non-native species. Examples of such sites seeded would be roadsides of newly constructed roads and timber harvest landings. Purposes of this seeding have been to gain a quick vegetative ground-cover to reduce potential for soil erosion and to provide forage for wildlife. Remanent stands of some seeded non-natives intermingled with native vegetation can still be found along the sides of some roads.

Currently, there is no Regional policy regarding the use of native vs non-native plants or seeds on NFS lands. The Dixie National Forest has developed an interim guideline to emphasize the use and perpetuation of native species. However, when restoring or rehabilitating disturbed or degraded lands to proper functioning condition, non-intrusive, non-native plant species can be considered for use where native species (1) are not available, (2) are not economically feasible, (3) can not achieve desired objectives as well as non-native species, (4) cannot compete with already established non-native species, and/or (5) have failed to meet objectives (Ref. DNF Interim Guide).

The private land pastures are customarily planted with non-native vegetation to maximize forage for livestock. Significant, if any, spread of such non-native vegetation to adjoining National Forest System (NFS) lands within the analysis area is not apparent.

The persistent non-native plant species currently on NFS lands within the analysis area are cheatgrass, mostly along the main roadway in the sagebrush and pinyon-juniper habitats and to a lesser extent within the pinyon-juniper habitat, and various thistles scattered in the pine, mixed conifer, and meadow habitats. The pinyon-juniper and sagebrush habitats lie within the 6000 to 7500-ft range, on a southerly aspect, within a precipitation range of 12 to 16 inches, predominately during September, and of warm season flora consisting of scarlet gilia (*Gilia aggregata*), western wheatgrass (*Elymus smithii*), Pacific aster (*Aster chilensis*), Indian ricegrass (*Stipa hymenoides*) and curl-leaf mountain mahogany (*Cercocarpus ledifolius*) identified within the pinyon-juniper habitat.

On-site reconnaisance indicates that the cheatgrass is limited in area coverage and density. Cheatgrass is often referred to as a winter annual, in that it flourishes with initial warming in late winter and early spring, taking advantage of moisture from winter precipitation. The late summer rains, which maintain the warm season flora mentioned above, is considered as a reason why the cheatgrass hasn't become established at a greater density than presently seen in this analysis area. The denser stands of closed canopy pinyon-juniper would also contribute to a low density and spread of cheatgrass (Goodrich and Rooks, 1999). The current low density of cheatgrass has no apparent adverse effect to the diversity of native plant species.

3.8.6 WILDLIFE CORRIDORS

The concept of wildlife corridor has two separate applications. One application would address a linear travelway for seasonal movement of wildlife, as big game species moving from a summer range area to a winter range area that's disjunct from the summer range area. The terrain which big game would transverse between seasonal use areas is sometimes referred to as a corridor if it's very specific to the movement needs of the species. Traditionally, such area transversed would be referred to as a seasonal migratory route.

A migratory route, or migratory corridor, becomes a habitat management concern when an obstruction or a substantial impedance is incurred. An obstruction would prevent the animals from transversing from one seasonal use area to another. A substantial impedance would cause abnormally high mortality, as risks involved in crossing a busy interstate roadway, or cause abnormally high malnutrition while enroute, as transversing a lengthy migratory route that's short of forage and shelter from adverse weather to maintain healthy body conditions.

Within this analysis area, obstruction or impedance to seasonal migration of big game, and of wild turkey, is not considered a management concern. Migratory movement is a relatively short shift in elevation which can be achieved in a minimal amount of time, as overnight, and no physical barriers or activities exist to obstruct or substantially impede movement. From normal summer use in the higher elevational portions of the ponderosa pine, the oak, and the mixed conifer habitats, in the

aspen habitat and into the spruce/fir habitats at higher elevation, big game and turkeys shift to the lower elevational portions of the ponderosa pine, oak, and mixed conifer habitats, and farther into the pinyon-juniper and sagebrush habitats during the severe part of winter.

Forest roads are easily crossed by these species. When vehicular traffic is present, crossing might be delayed for a short period, but is generally accomplished after the traffic leaves and commonly at night when traffic is non-existent. The Salt Gulch private lands lie in a north to south axis, and species can efficiently move down elevation into the pinyon-juniper and sagebrush habitats on either side of the private lands. The private lands are mostly hay lands, with residences either grouped or widely spaced, permitting big game and turkeys to not only utilize the land, but also move east and west across the private lands.

The second application of the wildlife corridor concept would address the travel or dispersal area between two or more disjunct populations, over a large landscape where suitable habitats for sustaining populations are widely disjunct. This application of the wildlife corridor concept is commonly referred to as dispersal corridor and is important in two manners. First, if species can transverse between disjunct suitable habitat areas inhabited by like-species, genetic interchange could be achieved which maintains the overall genetic viability of the species. Secondly, where any disjunct habitat area is not inhabited at a given time, due whatever reason, dispersal corridors provide an opportunity for dispersing species to colonize such area.

What constitutes a suitable dispersal corridor is specific to species under consideration. The basic characteristic needed in a dispersal corridor is adequacy of the corridor to ensure that some individuals of a given species survives the journey between the suitable habitat it left and the suitable habitat it arrives at, and is in well enough health condition to genetically interchange with like-species and/or populate that habitat. Reasonable quantities of food, shelter and protection, and mobility to travel these corridors, are factors associated with adequacy of a dispersal corridor. Adequacy of dispersal corridors may often be temporal, occurring only periodically, as habitats cycle through succession or disturbances. Species of limited mobility for dispersal, as a snail or some plant species, might progress in short leaps and bounds, when disturbances create suitable habitat conditions adjacent to or reasonably near existing suitable habitat that's presently inhabited by such species. Species of high mobility, as raptors and elk, are capable of dispersing over long distances of terrain which otherwise isn't considered suitable for inhabiting, but adequate for transversing across to gain suitable habitat elsewhere.

This analysis area contributes to the much larger landscape of Aquarius Plateau in providing adequate dispersal conditions for species associated with mid to late age-classes of habitat conditions, as found within the area. However, the area provides relatively few acres of early age-class conditions for associated wildlife and plant species, particularly those of low mobility, to disperse across the area. Dispersal of wildlife and plant species of low mobility capabilities and associated with early age-class habitat conditions are further hindered by adjoining drainages containing large acreages of mid to late age-classes of habitat conditions, with relatively few acres in the early age-class conditions.

3.9 FIRE

3.9.1 FIRE ACTIVITY

The Pretty Tree Bench analysis area (33,929 acres) generally falls within the East Side Fire

Management Zone (ESFMZ) (82,478 acres, of which 25,468 are wilderness and 57,010 acres are non-wilderness). During the period of 1970-1998 the ESFMZ had 175 fires with an annual mean of 6.03 fires per year. During this time period 1,089.2 acres burned with an annual mean of 37.56 acres per year. Lightning accounts for eighty nine percent of the fires, with humans accounting for the remaining eleven percent. Large fires which have occurred within this area include: in 1971 a fire occurred on Deer Mountain which consumed 427 acres, a 65 acre fire in 1972 in the Boulder Creek area, and a 45 acre fire in 1994 and in the Sweetwater area.

Euroamerican settlement took place in the late 1800's (Alvey, Edson no date). At this point the frequency of fire occurrence dropped off dramatically, probably due to grazing, the removal of Native American influence, and fire suppression. Past management practices, and the lack of fire has led to stand conditions which are denser than historical conditions. Currently there has been an unusually large accumulation of surface fuels and increased duff/litter layer. The increased density of understory species coupled with increased fuels accumulation has created a continuous fuels layer between the ground and forest canopy. This continuous fuel complex, largely prevented by frequent ground fires of the past, has increased the potential for a unwanted wildland fire to occur with devastating affects (PFC, Assessment, Aquarius Plateau/Boulder Top and Barney Top/Table Cliffs Subsection). Fuels profiles of these types have the potential to lead to control difficulties and a catastrophic fire situation, seriously hampering fire suppression efforts.

3.9.2 FIRE ECOLOGY

Current fuel conditions vary over the analysis area with vegetation conditions, physical features and fire history (i.e. the presence of timber, stand densities and species composition, slope, aspect and fire history). The primary fire groups (FG) found in the Pretty Tree Bench analysis area have been described in the Fire Ecology of Forests and Woodlands in Utah (Bradley et. al., 1992). Fire return intervals have been described in the Intermountain Region Draft Properly Functioning Condition Process (Amundson, et. al., 1996). The following FG are represented within the analysis area:

- Fire Group 0, Miscellaneous special habitats/non-forested or forested rock, meadows, mountain grasslands, and grass/sage.
- Fire Group 1, Pinyon-Juniper (PJ) woodlands.
- Fire Group 2, Gamble oak, and mountain mahogany.
- Fire Group 3, Ponderosa pine habitat types.
- Fire Group 5, Cool or moist Douglas-fir, upper mixed conifer.
- Fire Group 7, Aspen dominated.
- Fire Group 10, Lower subalpine habitat types.

Field plots were randomly placed along roads throughout the ESFMZ area to determine current fuel loads. Fuel loads were determined by utilizing the following photo series (USDA, FS, Southwest Region), (USDA, FS, Fischer, William, 1981). Fuels accumulations (fuel loads) vary throughout the analysis area. It is estimated that fuel loads currently vary from 1-30 tons per acre throughout the analysis area. Fuel loads and stand structures have changed from historical conditions, due to past management practices including fire suppression (Bradley et. al., 1992). An increase in biomass, insect/disease activity, and lack of fires influence has led to declining forest health. There has been an increase of young shade tolerant species, with clumps of regeneration (Arno, and Harrington, 1995). Fuel profiles of these types have led to uncharacteristic unwanted wildland fires. Fuels of this nature have the potential to lead to fire control difficulties and catastrophic fire situations, which are costly to suppress. It is likely that a large unwanted wildland fire would occur in the near future within the ESFMZ (A Fire Management Strategy For The East side Fire Management Zone, 4/98).

Within each FG fuels can be further defined into fuels models which are then used in mathematical modeling of fire behavior. There are 13 Standard National Forest Fire Laboratory (NFFL) fuel models (FM): 3- grass, 4- brush, 3- timber type, and 3- slash . The differences in fire behavior among the groups are basically related to the fuel load and its distribution among the particle size classes (Anderson. Hal, 1982).

To determine fire behavior local weather data was collected from the Buck Flat station from the period of 1990-1996. This historical weather data was then entered into the fire program FIR-FAMILY utilizing the subsystem pc FIRDAT and pc SEASON to provide information on variables of interest such as fuel moisture, relatively humidity, energy release component and temperature. Historical weather conditions were determined by the monthly seasonal mean, and 90th and 97th pe-rcentile. The BEHAVE Fire Behavior Prediction and Fuel Modeling System, Burn Subsystem FIRE1 program was utilized to process the weather record. Fire behavior characteristics, including rates of spread (ROS), flame lengths (FL), and fire line intensities (FLI) were produced using a standard 15 percent slope (ESFMZ, P. Goetzinger 4/98). Rate of spread is recorded in chains (66') per hour, flame lengths are record on feet and fire line intensity is recorded in BTU/FT/S. The predictions for each individual FM would not represent the appropriate fire behavior if a crown fire would occur, but rather predicts a ground fire scenario. Favorable conditions for a crown fire in-clude: dry fuels, low humidity and high temperatures, heavy accumulation of dead and downed lit-ter, conifer reproduction and other ladder fuels, continuous forest of conifer trees and etc. (Rothe-rmel, 1991).

3.9.2.1 FIRE GROUP 0

Fire group 0 consists of non-forested areas such as meadows. It includes grass/sagebrush with encroaching pinyon-juniper, and rocky sparsely vegetated slopes with ponderosa pine, and pinyon-juniper.

The range of meadows has been reduced by the encroachment of other vegetation types (PFC, Assessment, Aquarius Plateau/Boulder Top and Barney Top/Table Cliffs Subsection). Meadows were historically maintained by fire (Bradley et. al., 1992). Within the grass/sagebrush type mature sagebrush is taking over with pinyon/juniper encroaching. Historical fire return intervals ranged between 10-40 years (Amundson, et. al., 1996). Within the rocky sparsely vegetated slopes ample individual fire scars are present. Historically, fires have been limited to single tree events due to the lack of ground fuels to spread fire. Due to the lack of fuel continuity, fires which would occur currently would be of low intensity. The current fire suppression policy is to take an appropriate suppression response on all wildfires, (LRMP).

3.9.2.2 FIRE GROUP 1

Fire group 1 consists of all stands dominated by pinyon-juniper, and various shrub species, within the lower elevations.

Current fuel loads range from 1.4-6 tons per acre. Understory vegetation is reduced as the stand matures and the canopy closes. This reduces or eliminates ground fuels that are capable of carrying fire. Pinyon-juniper stands most likely to burn by wildfire have small scattered trees with abundant herbaceous fuel between the trees, or have dense, mature trees capable of carrying crown fire during dry, windy conditions. Currently , the closed canopy characteristics of pinyon/juniper lacks the necessary understory (herbaceous/shrub) layer to carry a ground fire. These stands are less likely to burn until conditions favor crown fires. Pinyon pine burns more readily than juniper (Bradley et. al.,

1992). This may be due to inherent flammability of the foliage, or the tendency of pinyon to inhabi more mesic sites, whereby understory fuels and tree densities are greater and fire spreads more rapidly. Stands therefore burn better as the proportion of pinyon to juniper increases (Bradley et. al., 1992). The stands within the analysis area are dominated by pinyon pine, therefore stand conditions are more prone to burning.

Fire exclusion has altered the fire regime within these stands. Historically these sites would have been classified as a FM 2 (early stage), FM 6 (mid), a combination of FM 8 and 6 (mid to late) and a FM 8 (late). Currently most sites are classified as a combination of FM 8 and 6. The following is a brief description of each FM and associated fire behavior.

Fuel Model 2 (Grass Group)

Fire spread is primarily through the fine herbaceous fuels, either curing or dead. When fuels have cured they become very flammable. The spread of the fire is driven by the wind through the fine continuous herbaceous fuels. Wind driven fires move rapidly, torching and spotting can occur. Common vegetation types include sagebrush, grass, bitter brush, and some oak under an open timber overstory. Fuel loads less than three inches would be approximately 4.0 tons per acre (Anderson, Hal, 1982).

Fuel Model 6 (Shrub Group)

Fires carry through the shrub layer where foliage is more flammable, but requires moderate winds greater than 8 mph. Sagebrush and oak generally fit this model. Pinyon/juniper and ponderosa pine may be also be present, but the shrub component must be the primary carrier of the fire. Fuel loads less than three inches would be approximately 6.0 tons per acre (Anderson, Hal, 1982).

Fuel Model 8 (Timber Group)

Fire behavior can generally be described as, slow burning ground fires with low flame lengths, although the fire may encounter an occasional "jackpot" or heavy fuels concentration that can flare up under extreme conditions. Fuel loads less than three inches would be approximately 5.0 tons per acre (Anderson, Hal, 1982).

Fuel Model 8 and 6 Combined

Combining these FM is necessary as the shrub component is lost. Fire behavior can be characterized as slow burning and of low intensity until it interacts with the shrub component, at which time intensity would increase causing greater intensity, individual crowning and spotting.

Fuel Model 2

	May	June	July	August	September	October	90th	97th
ROS	10	11	10	9	9	9	23	27
FL	3.5	3.6	3.6	3.3	3.3	3.4	5.5	6.2
FLI	85	94	92	79	70	79	231	304

Fuel Model 6

	May	June	July	August	September	October	90th	97th
ROS	11	13	12	10	10	10	26	29
FL	3.6	3.9	3.7	3.4	3.4	3.4	5.9	6.5
FLI	91	110	99	83	83	783	268	330

Fuel Model 8 combined run FM 8 (80%) and FM 6 (20%)

	May	June	July	August	September	October	90th	97th
ROS	1-10	1-13	1-12	1-10	1-10	1-10	2-26	2-29
FL	.6-3.4	.7-3.9	.7-3.7	.6-3.4	.6-3.4	.6-3.4	1.1-5.9	1.2-6
FLI	2-83	3-110	3-99	2-83	2-83	2-83	6-330	8-33
Av ROS	3	3	3	3	3	3	6	7

Fuel Model 8

	May	June	July	August	September	October	90th	97th
ROS	1	1	1	1	1	1	1	2
FL	0.7	0.7	0.7	0.6	0.6	0.6	1.1	1.2
FLI	2	3	3	2	2	2	6	8

Specific fire history studies are few for this fire group, but some estimates are available. In Arizona fire occurred at intervals of 10 to 30 years (Bradley et. al., 1992), this agrees with the Intermountain Region Draft Properly Functioning Condition Process fire return interval (Amundson, et. al., 1996). Evidence of past fire is common in climax juniper stands. Fire occurrence and extent has been severely limited by the removal of the fine fuels. This and past fire control policies have contributed to the current stand conditions. Ample single tree fire scars are present within the analysis area, this fire group has missed many fire return intervals, and is fire dependent. The current fire suppression policy is to take an appropriate suppression response on all wildfires, (DNF-LRMP).

3.9.2.3 FIRE GROUP 2

Fire group 2 is made up of montane communities including gambel oak, and mountain mahogany.

Typically oak stands occupy south facing slopes and are brush-like in form, very thick, with scattered ponderosa pine throughout. Current fuel loads range from 10-16 tons per acre. Most stands are mature in age, and conditions are present in which a severe unwanted wildland fire would occur.

Fire exclusion has altered the fire regime within these stands. Without fire, unnatural accumulations of litter, downed woody fuel, and overstocking have become more common. Historically these sites would have been classified as a FM 6. Currently most sites are classified as a FM 6, however FM 6 would currently under predict expected fire behavior due to heavy accumulation of fuels and the ponderosa pine overstory. The following is a brief description of this FM and typical associated fire behavior.

Fuel Model 6 (Shrub Group)

Fires carry through the shrub layer where foliage is more flammable, but requires moderate winds greater than 8 mph. Sagebrush and oak generally fit this model. Pinyon/juniper and ponderosa pine may be also be present, but the shrub component must be the primary carrier of the fire. Fuel loads less than three inches would be approximately 6.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 6								
	May	June	July	August	September	October	90th	97th
ROS	11	13	12	10	10	10	26	29
FL	3.6	3.9	3.7	3.4	3.4	3.4	5.9	6.5
FLI	91	110	99	83	83	83	268	330

Many factors have affected the fire regime in this FG since settlement. Fire started by Native Americans has been eliminated, grazing has removed fine fuels in which fires started and spread, and fires have been actively suppressed (Bradley et. al., 1992). Prior to settlement fires burned frequently through this fire group. This FG is fire dependent and should have frequent low intensity ground fires, with fire return interval of 20-50 years of mixed severity (Amundson, et. al., 1996). Paired historic and modern photographs of Central Utah foothills sites indicate that oak stands are now more extensive than they were 75 to 150 years ago (Bradley et. al., 1992). The relatively low fire frequency in this type may be the result of clone development over the last century and a half. Currently all wildfires are suppressed.

3.9.2.4 FIRE GROUP 3

Fire Group 3 is made up of relatively warm, dry sites where ponderosa pine is the climax dominant species, with a diversity of bitterbrush, gambel oak, sagebrush, and snowberry (Bradley et. al., 1992).

Although fires were frequent in most presettlement ponderosa pine stands, severity remained relatively low (Bradley et.al., 1992). Though fires do occur within the other fire groups, more fires do occur within this FG. Due to fuel characteristics within this FG fire are generally larger in size, or have the potential to grow larger, being more difficult and costly to suppress (ESFMZ, P. Goetzinger 4/98).

Current fuel loading levels in this group are estimated between 8-16 tons per acre. Stands with heavy dead or live fuel loads are susceptible to severe fire (Federal Wildland Fire Management Plan, 1995). Historically, frequent low severity fires restricted the accumulation of large down woody fuels. Fine fuels (grass and needles) were the medium through which historical fires spread, since most large fuel (boles and branches) would have been consumed by the frequent fires (Bradley et.al., 1992). Today's forest condition has changed fire intensities greatly, with the accumulation of needle cast, downed woody material, gambel oak and thick clumps of immature timber, fire will burn with a greater intensity, and a longer burn duration, with the present amount of ladder fuels available, fire can easily become stand replacing. High flammability results from typically abundant annual needle cast of ponderosa pine. In dense stands, needle cast may exceed 1.75 ton per acre each year. Without periodic low intensity ground fire, litter and woody fuels build up to levels that promote high burning intensities (Bradley et. al., 1992).

Many decades of fire exclusion have altered the fire regime in most stands. Without fire, unnatural accumulations of litter, downed woody fuel, and overstocking have become more common. Historically these sites would have been classified as a FM 2 and FM 9. Currently most sites are classified as a FM 11. The following is a brief description of each FM and associated fire behavior.

Fuel Model 2 (Grass Group)

Fire spread is primarily through the fine herbaceous fuels, either curing or dead. When fuels have cured they become very flammable. The spread of the fire is driven by the wind through the fine continuous herbaceous fuels. Wind driven fires move rapidly, torching and spotting can occur. Common vegetation types include sagebrush, grass, bitter brush, and some oak under an open timber overstory. Fuel loads less than three inches would be approximately 4.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 9 (Timber Group)

Fires will run through the surface litter at a fair rate of spread. Concentrations of dead and woody material will contribute to possible torching out of trees, spotting, and crowning. Fuel loads less than three inches would be approximately 3.5 tons per acre (Anderson. Hal, 1982).

Fuel Model 11 (Logging Slash)

Fires are fairly active in the slash and herbaceous material intermixed with the slash. Concentrations of dead and down woody material will contribute to possible torching out of trees, spotting and crowning. Fuel loads less than three inches would be approximately 11.5 tons per acre (Anderson. Hal, 1982).

Fuel Model 2

	May	June	July	August	September	October	90th	97th
ROS	10	11	10	9	9	9	23	27
FL	3.5	3.6	3.6	3.3	3.3	3.4	5.5	6.2
FLI	85	94	92	79	70	79	231	304

Fuel Model 9

	May	June	July	August	September	October	90th	97th
ROS	3	3	3	2	2	2	6	7
FL	1.6	1.8	1.7	1.6	1.6	1.6	2.7	3
FLI	16	20	18	15	15	15	49	61

Fuel Model 11

	May	June	July	August	September	October	90th	97th
ROS	3	2	3	2	2	2	5	6
FL	2.3	2.4	2.3	2.2	2.2	2.2	3.4	3.8
FLI	35	38	36	32	31	31	82	106

Fire frequencies of 4 to 7 years have been estimated for ponderosa pine forests in Bryce Canyon National Park (Bradley et. al., 1992). The fire return interval for this type of fuels should be 5-25 years (Amundson, et. al., 1996), fires should be a low intensity ground fire. Fire has historically played an important role in Utah's ponderosa pine forest, maintaining open stand conditions by periodically thinning the understory and removing patches of seedlings. Fire exposes mineral soil, reduces seedling damaging cut worm populations, reduces competing vegetation and increase nutrient availability. Periodic fires can create uneven-aged stands comprised of various even-aged groups. Severe fires will result in predominantly even-aged stands. Nutrients trapped in woody

debris, litter, and duff are released by burning. This process helps to maintain forest health in these relatively dry stands, where decay takes place slowly. Although fires were frequent in most presettlement ponderosa pine stands, severity remained relatively low. Stand replacement fires were a rare event (Bradley et .al., 1992). Many decades of fire exclusion have altered the fire regime. Without fire, unnatural accumulations of litter and downed woody fuels, and overstocking have become more common. Stands with heavy dead or live fuel loads are susceptible to severe fire. All wildfires are currently being suppressed.

3.9.2.5 FIRE GROUP 5

Fire Group 5 consists of moist sites with ponderosa pine, Douglas-fir, mixed conifer and/or seral aspen. The understory consists of white fir, subalpine fir, and Douglas-fir.

Without fire, unnatural accumulations of litter and downed woody fuel and overstocking have become more common. Current fuel load levels in this group are estimated between 10-20 tons per acre. Increased stocking levels (both over/under), dead and downed fuels, dwarf mistletoe, and witches broom have contributed to stand conditions which have serious crown fire potential under severe burning conditions. This fire group is fire dependent and has missed several fire return intervals.

Fire exclusion has altered the fire regime within these stands. Without fire, unnatural accumulations of litter, downed woody fuel, and overstocking have become more common. Historically these sites would have been classified as a FM 8. Currently most sites are classified as a FM 10. The following is a brief description of each FM and associated fire behavior.

Fuel Model 8 (Timber Group)

Fire behavior can generally be described as, slow burning ground fires with low flame lengths, although the fire may encounter an occasional "jackpot" or heavy fuels concentration that can flare up under extreme conditions. Fuel loads less than three inches would be approximately 5.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 10 (Timber Group)

Fires burn on the surface with greater fire intensity than other timber litter models, and burn with a very intensity level. Dead and down fuels resulting from overmature and dying trees from insect/disease mortality create large fuel loads of dead material on the forest floor. Crowning, spotting and torching of individual trees is frequent and lead to a stand replacement event. Fuel loads less than three inches would be approximately 12.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 8

	May	June	July	August	September	October	90th	97th
ROS	1	1	1	1	1	1	1	2
FL	0.7	0.7	0.7	0.6	0.6	0.6	1.1	1.2
FLI	2	3	3	2	2	2	6	8

Fuel Model 10

	May	June	July	August	September	October	90th	97th
ROS	3	4	4	3	3	3	7	9
FL	3.4	3.6	3.6	3.3	2.9	3.3	5.1	5.9
FLI	80	89	91	73	59	74	200	270

Historically low intensities ground fires occurred every 10 to 30 years (Amundson, et. al., 1996). Currently all wildfires are being suppressed.

3.9.2.6 FIRE GROUP 7

Fire Group 7 includes community types where aspen appears to be climax or a long term seral dominant species, generally with a mixed conifer understory.

Pure aspen stands are not considered to be highly combustible. In fact it is sometimes treated as a green belt (fire break) among other more flammable fire groups. Fuel loading under these conditions are very minor. Present conditions are depicted by mature aspen overstories with heavy increasing conifer (Douglas-fir, subalpine fir) regeneration. Fuel loads are now estimated to be between 5-15 tons per acre.

Fire exclusion has altered the fire regime within these stands. Without fire, these stands have started to convert from pure aspen to conifer. This has added to unnatural accumulations of litter, downed woody fuel. Young mixed conifer trees are very flammable and are easily killed or injured by fire, because of their thin bark and low, dense branching habit. High intensity; stand replacing fires can would be expected as these stands convert to a FG 10 and FM 10. Historically these sites would have been classified as a FM 8. Currently most sites are classified as a FM 8 but are succeeding to a FM 10. The following is a brief description of each FM and associated fire behavior.

Fuel Model 8 (Timber Group)

Fire behavior can generally be described as, slow burning ground fires with low flame lengths, although the fire may encounter an occasional "jackpot" or heavy fuels concentration that can flare up under extreme conditions. Fuel loads less than three inches would be approximately 5.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 10 (Timber Group)

Fires burn on the surface with greater fire intensity than other timber litter models, and burn with a very intensity level. Dead and down fuels resulting from overmature and dying trees from insect/disease mortality create large fuel loads of dead material on the forest floor. Crowning, spotting and torching of individual trees is frequent and lead to a stand replacement event. Fuel loads less than three inches would be approximately 12.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 8

	May	June	July	August	September	October	90th	97th
ROS	1	1	1	1	1	1	1	2
FL	0.7	0.7	0.7	0.6	0.6	0.6	1.1	1.2
FLI	2	3	3	2	2	2	6	8

Fuel Model 10

	May	June	July	August	September	October	90th	97th
ROS	3	4	4	3	3	3	7	9
FL	3.4	3.6	3.6	3.3	2.9	3.3	5.1	5.9
FLI	80	89	91	73	59	74	200	270

Fire plays a prominent role in maintaining and regenerating aspen. It is believed that fires may have occurred as often as every 7 to 10 years, but were of low intensity (Bradley et. al., 1992). Lethal fire regimes occur on 20-100 year fire return interval (Amundson, et. al., 1996). Currently all wildfires are suppressed.

3.9.2.7 FIRE GROUP 10

Fire group 10 contains the bulk of subalpine habitat types, those that are neither very moist nor very cold. Climax species are subalpine fir and Engelmann spruce.

Currently unnatural fuel loads exists and range from 20-30 tons per acre. The heaviest down woody fuel loads in Utah forests can be expected in fire group 10 (Bradley et. al., 1992). Live and standing dead fuel can contribute substantially to overall fire hazards. Dense spruce and fir understory trees along with low hanging live and dead branches of overstory trees, form effective fuel ladders to the overstory crowns. Dead subalpine fir and Engelmann spruce trees have substantial amounts of fine fuels in ladder twigs, which often curl against the larger branches or trunk, frequently along the entire length of the tree. Dead trees are often closely intermingled with live vegetation and easily spread fire to overstory crowns during dry weather. Fuel moisture is generally higher in this fire group, due to more precipitation, and heavy canopy cover moisture is retained for a longer duration. The majority of the fuel load is made up of large fuels, greater than 3 inches in diameter. A combination of deep duff and large amounts of dead, rotten fuel can result in hot, smoldering surface fires during unusually dry conditions. When a dense understory exists, fire can easily spread to the tree crowns and consume the stand. Even if surface fires do not burn tree crowns, there is a good chance that the large accumulations of fuel will produce enough heat to kill the tree cambium and/or bake the shallow root systems (Bradley et .al. , 1992).

Fire exclusion has altered the fire regime within these stands. Without fire, unnatural accumulations of litter, downed woody fuel, and overstocking have become more common. Historically these sites would have been classified as a FM 8. Currently most sites are classified as a FM 10. The following is a brief description of each FM and associated fire behavior.

Fuel Model 8 (Timber Group)

Fire behavior can generally be described as, slow burning ground fires with low flame lengths, although the fire may encounter an occasional "jackpot" or heavy fuels concentration that can flare up under extreme conditions. Fuel loads less than three inches would be approximately 5.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 10 (Timber Group)

Fires burn on the surface with greater fire intensity than other timber litter models, and burn with a very intensity level. Dead and down fuels resulting from overmature and dying trees from insect/disease mortality create large fuel loads of dead material on the forest floor. Crowning, spotting and torching of individual trees is frequent and lead to a stand replacement event. Fuel loads less than three inches would be approximately 12.0 tons per acre (Anderson. Hal, 1982).

Fuel Model 8

	May	June	July	August	September	October	90th	97th
ROS	1	1	1	1	1	1	1	2
FL	0.7	0.7	0.7	0.6	0.6	0.6	1.1	1.2
FLI	2	3	3	2	2	2	6	8

Fuel Model 10

	May	June	July	August	September	October	90th	97th
ROS	3	4	4	3	3	3	7	9
FL	3.4	3.6	3.6	3.3	2.9	3.3	5.1	5.9
FLI	80	89	91	73	59	74	200	270

Fire return intervals should range from 50-80 years of mixed severity, with a lethal fire occurring every 100-300 years (Amundson, et. al., 1996). Stands become increasingly susceptible to fire as succulent forbs are succeeded by woody fuel and litter. Fire does play an important role in maintaining forest health. Fire would have maintained stands with fire dependant species such as aspen. Currently all wildfires are suppressed.

3.9.2 CUMULATIVE EFFECTS AREA

The Cumulative Effects area would include the ESFMZ and adjacent lands to the north all the way to the Aquarius Plateau. Fire management zones are a basic geographical area, having common fuel types, common fire occurrence and fire suppression response times. Fires which started within the ESFMZ would generally spread toward the Aquarius Plateau to the north, this is why the ESFMZ and the area to the north were chosen as the cumulative effects area.

3.10 HERITAGE RESOURCES

The areas surrounding and within the total project analysis area have been identified as being used by human beings for at least 8,000 years. A total of 2,749 acres within and immediately adjacent to the total analysis area have been intensively surveyed for cultural resources. A total of 75 sites have been found, and of these, 53 have been identified as being Historic Properties and are eligible for inclusion in the National Register of Historic Places. Types of sites identified include, but are not limited to, campsites, stone quarries, tool manufacturing areas, kill sites, and long term seasonal encampments. Historic wooden structures such as fences, water troughs, and corrals are known to exist within the area.

Those areas within the analysis area were surveyed by the Forest Archaeologist and at times assisted by seasonal archaeological technicians.

3.11 SOCIO/ECONOMIC

3.11.1 ECONOMICS AND SOCIAL ECONOMICS

The Final Environmental Impact Statement of the Dixie National Forest Land and Resource Management Plan describes the local Zone of Influence as those counties whose economies are directly impacted by Forest actions. The Zone of Influence for the Dixie encompasses the following counties: Piute, Garfield, Wayne, Kane, Iron and Washington. The boundaries of the Dixie National Forest lie within these counties (LRMP FEIS, Appendix BII-71).

Because of variation between local communities' economic bases, the Zone of Influence is further broken down into analysis units. The PTB project area is within the "**Escalante/Boulder**" analysis unit, and adjacent to the "**Panguitch**" analysis unit. The Escalante/Boulder and Panguitch analysis units comprise the Affected Environment and cumulative effects area of the proposed action.

The Panguitch and Escalante/Boulder analysis units are located in Garfield County. Panguitch is the county seat of Garfield County. Economic figures are based on information published in the Fourth Quarter of 1997 edition in the Utah Quarterly Economic Newsletter. Fourth quarter 1997 figures show an unemployment rate for 1997 of 8.3%, one of the highest in the state but much better than one year ago. The service industry is the largest employer of nonfarm jobs at 40% of total, with government 26%, trade 15%, manufacturing 8%, and transportation/Communications/Utilities 6%. General trends in the last year have shown an increase of 22% in the service sector, a decrease of 7% in government and 77% in mining. Increases in jobs are predominantly attributed to tourism. Average hourly wages in Utah indicate mining and manufacturing provide the highest wages at $17.89 and $13.23 per hour. Garfield County has also shown strong gain of 10% in wholesale and retail sales over the past several years. Over the last year, retail sales have increased 21%. The largest employers within the county are Ruby's Inn, County School District, Garfield Memorial Hospital, Utah Forest Products, South Central Utah Telephone, Garfield County, National Park Service, Tropic Realty, US Energy Corp., Turnabout Ranch, Inc., Panguitch Drug Co., and Offshore Marina, Inc.

Garfield County is more reliant on tourism than any other county, but also continues to have the highest unemployment rates in Utah (May 1998), due to the seasonal nature of tourism. The county's adjacency to important recreation and tourism attractions is becoming increasingly important to the local economy. Grand Staircase Escalante National Monument, Capitol Reef, Bryce, and Zion National Parks are situated in or near the analysis units. These features and adjacency to major north and west travel corridors to the Lake Powell Recreation Area contribute to increased traffic in the Panguitch and Escalante/Boulder analysis units. Ruby's Inn at Bryce is one of the largest employers within Garfield County.

One of the largest employers is Utah Forest Products (UFP), based in Escalante. UFP currently employs 76 employees with a 1997 payroll of $1,453,000. They additionally utilize 5 sub-contractors who employ 50 employees at a cost of $1,108,000 in 1997. In 1997, the sawmill processed 9.2 MMBF, while having a capacity to process 17 MMBF. The mill currently has 16.6 MMBF under contract, including sales on Kaibab, Dixie, and Fishlake National Forests.

There are several small sawmill operators located within the Garfield and Wayne County area which purchase timber from federal land. A potential bidder from this project proposal, is Stoltze Aspen Mills, located in Sigurd, Utah. This sawmill specializes in aspen products, employs about 30

employees, and has been contacting the Dixie National Forest for aspen logs.

The "Farm" sector, made up primarily of cattle ranching, is also an important contributor to the Garfield County economy. The project area is located adjacent to Salt Gulch and Boulder, for which the predominant land use is cattle ranching/farming operations.

The county's adjacency to important recreation and tourism attractions is becoming increasingly important to the local economy. Escalante Grand Staircase National Monument, Capitol Reef, Bryce, and Zion National Parks are situated in or near the analysis units. These features and adjacency to major north and west travel corridors to the Lake Powell Recreation Area contribute to increased traffic in the Panguitch and Escalante/Boulder analysis units.

3.12 AIR QUALITY

3.12.1 PARAMETERS

There are five parameters important to the determination of air quality and its potential effects. These include amount of airborne particulates, gaseous pollutants, visibility, prevention of significant deterioration (PSD) designation, and proximity to residential private subdivisions or class I airsheds.

3.12.1.1 EXISTING AIRBORNE PARTICULATES

The concentrations of Total Suspended Particulates (TSP) and particulate matter less than ten micrometers (PM-10), are monitored by the State of Utah, Department of Environmental Quality, division of Air Quality (UDAQ).

The analysis area is located in Garfield County. Garfield county is classified as an Attainment Area (which means an area considered to have air quality, as good as or better than, the National Ambient Air Quality Standard (NAAQS) as defined in the Clean Air Act). Of the 29 counties located in the State of Utah, Garfield County has the seventh lowest concentration of (PM-10) (Utah Division of Air Quality, 1993). Primary emission sources that would contribute to particulate levels would be motor vehicle exhaust, emissions from recreational campfires, prescribed fire, dust, and wildfire within or adjacent to the project area.

3.12.1.2 GASEOUS POLLUTANTS

The (UDAQ) also measures the following pollutants, Sulfur Dioxide (SO^2), Nitrogen Oxides (NO^x) and Carbon Monoxide (CO) within Garfield County. Garfield County is also classified as an Attainment Area for these gaseous pollutants. Garfield County is rated as having the eighth lowest concentration of ($S0^2$), fourth lowest (NO^x) and the sixth lowest concentration of (CO) within the State of Utah (Utah Division of Air Quality, 1993).

3.12.1.3 VISIBILITY

Visibility data is currently being collected within three national parks surrounding the analysis area, Bryce Canyon, Grand Canyon and Canyonlands National Parks. Visibility within the analysis area can be characterized as being the second best in the Western United States, only being surpassed by the area where the borders of Nevada, Utah and Idaho meet (Shaver, Morse, O'Leary, 1988). Data

shows that on 10 percent of the summer days visibility is approximately 78 miles and that on 90 percent of the days during the summer visibility is approximately 165 miles. Visibility is generally better during the winter months than the summer months (Shaver, Morse, O'Leary, 1988).

The United States Environmental Protection Agency (EPA) discusses visibility trends within the EPA Document entitled "National Air Quality and Emissions Trends Report, 1996". With data collected from the Interagency Monitoring of Protected Visual Environment (IMPROVE) network between 1992-1995, EPA concurs with the visual quality being the second best in the Western United States, only being surpassed by the area where the borders of Nevada, Utah, and Idaho meet, but also includes southeast Wyoming (EPA, 1996). During the period of 1988-1995, using data from the IMPROVE networks within the National Parks visibility trends showed that visibility within Bryce, Canyonlands and Grand Canyon National Parks has improved (EPA, 1996). Within the Class I Airsheds of concern surrounding the analysis area visual impairment has been reduced. This can be contributed to both National and State laws and requirements regarding emission production. The Clean Air Act requires protection of visibility, or visual air quality, this is assured by both National and State agencies. It is likely that the visibility trend would continue to improve.

3.12.1.4 PREVENTION OF SIGNIFICANT DETERIORATION (PSD) REGULATIONS

Under PSD regulations, the project area is designated as a Class II Airshed. All areas within five miles of the project area are all designated as Class II Airsheds, including the Box-Death Hollow Wilderness area, and the Grand Staircase Escalante National Monument.

The analysis area does not fall under PSD requirements because the source of pollutants can be characterized as an Area Source instead of a Stationary Source.

3.12.1.5 PROXIMITY TO PRIVATE SUBDIVISIONS OR CLASS 1 AIRSHEDS

As stated under PSD, there are no Class I Airsheds within 5 miles of the project area. The closest Class I Airshed is Capital Reef National Park which is 22 miles northeast of the project area. Bryce Canyon National Park is also a Class I Airshed and is located 36 mile to the southwest of the project area. Other areas of concern that are within 5 miles of the project area are: 1) Box-Death Hollow Wilderness Area to the south and 2) Calf Creek Campground to the south, 3) Salt Gulch Ranches, 4) The town of Boulder and occupied private dwellings along highway 12, and 5) The Grand Staircase Escalante National Monument. Within the analysis area the prevailing winds are out of the southwest moving to the northeast.

3.12.2 CUMULATIVE EFFECTS AREA

The cumulative effect area (CEA) for air quality includes a large portion of Southern Utah, encompassing lands within Kane, Garfield and Wayne counties. Areas of interest within these counties include: the Escalante, Powell and Teasdale Ranger Districts, the Grand Staircase Escalante National Monument, Bryce Canyon, Canyonlands and Capitol Reef National Parks. The cumulative effects area was chosen for its ability to look at the IMPROVE networks which monitors visibility and can be used for visibility trends.

3.13 LIVESTOCK GRAZING

The project analysis area falls within the Sand Creek Division of the Boulder Cattle Allotment.

There are 754 head of cattle permitted to graze from 6/16 - 10/15 for a total of 3,016 head months. The analysis area does not encompass the entire Sand Creek division.

The Sand Creek Division is comprised of three grazing units; Bear Creek, Sand Creek and Sweetwater. The allotment management plan for this allotment approved in 1977 prescribes a three unit deferred-rotation grazing system. On year one, the Bear Creek unit is grazed first, Sand Creek second and Sweetwater last. On year two, Sand Creek is grazed first, Bear Creek second and Sweetwater last. The pattern then repeats itself. In 1996, the allotment management plan changed the scheduled rotation (EA for Issuance of 10-Year Term Grazing Permits, Escalante Ranger district, Cattle Allotments, pages 2, 17, 27) whereby a 4 unit deferred rotation grazing system will be developed to improve livestock distribution and effects on the Aquarius paintbrush. Implementation of this system is expected within 5 years, depending on appropriations.

Maximum grazing utilization allowed is 50% total forage utilization. If allotment inspections indicate that utilization has reached or exceeded proper use cattle are moved from the allotment off the Forest. Key areas identified for this Division are Boulder Swale, Dry Lake, McGath Lake, and Sweetwater.

No grazing occurs in the portion of the Wilderness area within the analysis area due to steep slopes and lack of water.

Range improvements include the allotment and unit boundary fencelines, 3/4 mile of pipeline, one pond, and one trough as part of the Birch Springs Pipeline. Additionally, there are approximately 7-10 developed ponds, some of which are in need of maintenance. All streams and springs are used by livestock for water. Several watershed protection fences have been constructed to prevent motorized access across meadows.

Roads in the analysis areas are used by grazing permittees for livestock management purposes such as salt distribution, range improvement maintenance and to check on the well-being of livestock.

Erosion in some of the meadows has reduced forage production in these areas. Roads located in meadow habitat have also decreased forage production.

The cumulative effects area for this project is the Boulder Cattle Allotment, which includes the project area and controls grazing practices for the area.

3.13.1 GRAZING HISTORY

Historical grazing started soon after pioneer settlement. Problems from over utilization (Boulder C&H Allotment, Escalante Ranger District, Dixie National Forest, 1977 and The Dixie National Forest Managing an Alpine Forest in an Arid Setting, 1987, USFS Intermountain Region) did not start until the growing local herds competed with large transient herds. Beginning in 1892 with the advent of drought, through 1905 range conditions deteriorated and losses to cattle from starvation occurred (Dixie National Forest, page 39-41). From 1892 to 1900, it was estimated that 30,000 to 35,000 cattle and horses grazed on the Aquarius Plateau. Due to the loss of ground vegetation from past grazing there was virtually no fire hazard on the Dixie National Forest (Dixie National Forest, page 83) during its early inception (1905). Early attempts at range management included reductions in season of use and stock numbers, construction of range improvements, and permitted use. On the Escalante Ranger District permitted cattle decreased from 8,500 in 1922 to 4,807 in 1960 while sheep decreased from 23,200 in 1922 to 1,400 in 1960. Serious range deterioration from

sheep and cattle overstocking and a lack of management has been identified (Dixie National Forest, pages 89-95, 109-114, 128-129) occurred. In 1959, several livestock number reductions and changes in the grazing season were developed to bring numbers in line with available grazing. Reseeding, fence construction, and water developments were also included to improve conditions. From 1959 to 1969 various deferments, reductions, and grazing seasons were tried. In 1970, the season was set at June 16 to September 30, the allotment was divided into two divisions, with three pastures in each one, as well as using a deferred rest rotation system.

Recent Management Decisions

The original Boulder C&H Allotment Management Plan was approved in 1977. Under this decision, the deferred rotation grazing system would be continued, 50% utilization would be established as the standard average over the unit (80% was previously used), and AUM's would be continued at 6352 for 1588 head of cattle.

In 1986 the DNF-LRMP was approved, which included the continuation of current grazing practices and livestock numbers, utilizing the existing allotment management plans.

In 1995, an environmental analysis was completed and approved, for Issuance of 10-Year Grazing Permits, including the Boulder C&H allotment. Conditions within this allotment were described (Environmental Assessment for Issuance of 10-Year Grazing Permits, Escalante Ranger District, Cattle Allotments, 1995) as satisfactory (EA, page 17), except within the Sand Creek Division which exceeded proper use standards (EA, page 26). The decision (Decision Notice and FONSI, Issuance of 10-Year Grazing Permits, Escalante Ranger District, Cattle Allotments, 1995) allowed for 808 head of cattle, a June 16 to October 15 season of use, and continued use of the deferred rotation grazing system. New utilization standards were established for various vegetation types. Monitoring of key areas were also identified. Improvements approved included separating the Sand Creek and Boulder allotments, increasing the Sweetwater unit, and construction of fencelines. These improvements have been initiated in 1998, with completion tentatively planned for 2001. Completion of these improvements would further improve vegetation utilization.

Additionally, each fiscal year an Annual Operating Plan is issued to the permittees stating permit requirements for the grazing season to meet the Allotment Management Plan. The Operating Plan states rotation schedule, management objectives, maintenance responsibilities, planned improvements, and utilization among other items. The Operating Plan along with the Allotment Management Plan provides the means to improve ground conditions over time.

In 1992 monitoring within the allotment calculated utilization (% weight) at key areas as; 38, 44, 59, 46, 64, 53, and 30. The most recent monitoring, completed from August through October of 1998, calculated percent utilization as; 38, 50, 57, 46, 46, 44, and 34 (Range Utilization data sheets, 1998 and 1992).

Applicable Laws

Some of the laws which dictated recognition and management of grazing on Forest Service lands include the Organic Act of 1897, Granger-Thye Act of 1950, Multiple-Use Sustained-Yield Act of 1960, Forest and Rangeland Renewable Resources Planning Act of 1974, and National Forest Management Act of 1976.

3.14 SPECIAL USES AND MINERALS

One Special Use Permit is issued to the Salt Gulch Irrigation Company. This permit is for an irrigation water transmission ditch and a storage pond within the analysis area. The ditch is actually a combination of man-made ditches tied together with natural drainages to convey water from Sand Creek and McGath Reservoir to the private lands in Salt Gulch. McGath Reservoir and Dam are included in the Special Use Permit and lie outside but adjacent to the analysis area. The original Special Use Permit issued in 1974 states that the irrigation system has been in use for approximately eighty years.

The man-made segments of the irrigation ditch are authorized under the permit and total approximately three miles in length and ten-foot width. The full length of the ditch is eleven miles. Segments of the ditch that are natural channels are not included in the permit. The overall ditch is located in parts of sections 27, 28, 29, 33, and 34 of T.32 S., R.3 E., and sections 3, 10, 11, 13, 14, 23, 24, and 25 of T.33 S., R.3 E. A small storage pond included in the irrigation system and located on National Forest System land, adjacent to private land, is also included in the permit.

Typically, access is needed to these improvements in the spring for annual maintenance. Maintenance is required to ensure that obstructions to the ditch flow are removed, that any breach of the system is repaired, and that the McGath Reservoir Dam is in proper function. Most maintenance is conducted by hand tools. Occasionally, maintenance might require use of heavier equipment, such as a backhoe.

Outfitter-Guide services also occur within the analysis area and surrounding areas and are authorized under Special Use Permits. These outfitter-guide services consist of guided hunts, fishing, hiking, horseback rides, camping and sightseeing.

There are no mineral developments within the analysis area. There are three Carbon Dioxide (CO^2) wells located just outside the northwest boundary of the analysis area and within the area of influence for cumulative effects analysis. These wells have current mineral leases from the Department of the Interior. These wells are currently inactive and are either plugged or capped and fenced.

3.15 TRAVEL MANAGEMENT

3.15.1 SETTING

The current travel management philosophy in the project area is "open unless posted closed", meaning that unless a travel route is specifically designated as closed it is open to travel by motorized vehicles. There are two areas specifically closed to motorized travel; Box-Death Hollow Wilderness Area, approximately 2,749 acres and the Pretty Tree Bench/Mount Ogden area, approximately 9,300 acres (Forest Service, 1998). The balance of the project area, 21,880 acres is open to motorized travel, except for those roads which are seasonally closed as noted below. There are approximately 66.8 miles of open road within the analysis area.

There are no travel restrictions on over the snow machines except in the two areas specifically closed to motorized travel. During most years lack of sufficient snow accumulation in the lower elevations, limit snow machine travel to the mid to high elevations.

3.15.1.1 FOREST ROAD 153

This road which provides access to the area is also called the Hells Backbone Road. It is a gravelled, single lane road with turnouts.

3.15.1.2 FOREST ROAD 163

This route is located in the Sand Creek drainage. It is approximately 1.6 miles in length and provides access to two carbon dioxide (CO^2) wells. The road is constructed of native material and has some drainage culverts that are plugged and washed out. Reconstruction work was done in the fall of 1994 so that work could be completed at the drill site. This repaired the road and made it travelable by motorized vehicles for the first time in two years. The Sand Creek Soil Stabilization Project decision provided for the reconstruction of this road and limited access to periods of dry weather only (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.3 FOREST ROAD 494

This is the road to McGath Lake. It is presently located within meadows and has some sections that are quite steep. It is constructed of native material, is poorly drained, and is approximately 3 miles in length. This road is used by the Salt Gulch Irrigation Company to access the reservoir at McGath Lake. This road has been used by the irrigation company since 1895 and is pronounced to be eligible for RS 2477 classification. The Sand Creek decision provided for the continued use of this road by the irrigation company. However, the road was reclassified as a four wheel drive road (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.4 FOREST ROAD 566

This route is the primary access to the northern portion of the analysis area. The road terminates at Dry Lake Trailhead and provides access into the Bear Creek drainage. The road is approximately 4.7 miles in length. Approximately 2 miles are gravelled. The Sand Creek decision provide for gravel surfacing of the road and the elimination of drainage problems through properly culvert placement and relocation of a portion of the road (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.5 FOREST ROAD 714

This low standard road was constructed in 1982 in conjunction with the Grimes Creek Timber Sale. It is approximately 2 miles in length and constructed of native material. Although waterbarred, the road can be travelled by motorized vehicles. The Sand Creek decision provided for a gated seasonal (October 1 to June 30) closure of this road. In addition, the decision provided for a year long closure of the last 0.9 miles of road 714 and the three spurs which junction with this road (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.6 FOREST ROAD 717

This route was constructed in 1982 as part of the Grimes Creek Timber Sale transportation system. It is 0.9 miles in length and constructed of native material. It has been waterbarred and travelled by motorized vehicles. Although this road would be needed for future management activities in the

area, the Sand Creek decision provided for the closure of this road with a physical barrier (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.7 FOREST ROAD 718

This route was constructed in 1982 as part of the Grimes Creek Timber Sale transportation system. It is 0.8 miles in length and constructed of native material. It has been waterbarred and travelled by motorized vehicles. The Sand Creek decision provided for the closure of this road with a physical barrier approximately 150 feet from its junction with road 153, which would allow the continued use of a dispersed camp site (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.8 FOREST ROAD 719

This route was constructed in 1982 as part of the Grimes Creek Timber Sale transportation system. It is 1.2 miles in length and constructed of native material. It has been waterbarred and travelled by motorized vehicles. The Sand Creek decision provided for a gated seasonal (October 1 to June 30) closure of this road (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.9 FOREST ROAD 719A

This is not a system road. It was part of the skid trail system for the Grimes Creek Timber Sale. Presently it is being used by four wheel drives and Off Highway Vehicles (OHVs). The Sand Creek decision provided for the permanent closure of this travel route by reshaping the route to a natural contour and revegetation (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.10 FOREST ROAD 720

Historical use by the Salt Gulch Irrigation Company to maintain the water ditch resulted in the development of a two track road. In 1982 it was constructed as a forest road and was used during the harvest of the Grimes Creek Timber Sale. It is constructed of native material and travelled by motorized vehicles. The Sand Creek decision provided for a gated seasonal (October 1 to June 30) closure of this road. In addition, the upper fork was permanently closed with a gate (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.11 FOREST ROAD 720A

This route was constructed in 1982 as part of the Grimes Creek Timber Sale transportation system. It is 1 mile in length and constructed of native material. The road is not passable beyond the Lake Creek Ditch. The Sand Creek decision provided for a gated seasonal (October 1 to June 30) closure of this road (Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, 1995).

3.15.1.12 FOREST ROAD 473-GREAT WESTERN TRAIL (GWT)

The section of the GWT between McGath Lake and Dry Lake uses an old two track road. It is constructed of native material and is in poor condition. It is approximately 2 miles in length and travelled by off-road vehicles.

3.15.1.13 FOREST ROAD 699 AND ASSOCIATED SPURS

This system of roads was constructed as part of the transportation system for the Sweetwater and Side Hollow Timber Sales. They were constructed of native material and are presently travelled by four wheel drive vehicles and OHVs. Presently this road system is seasonally closed (August 20 to June 1) by a gate where road 699 crosses Sweetwater Creek.

3.15.1.14 FOREST ROAD 887

This road was constructed as part of the transportation system for the Bear Creek Timber Sale. It is constructed of native material. Presently the road is gated and closed to motorized travel.

3.15.1.15 FOREST ROAD 166

This is a gravel surfaced road and open to all motorized travel. It provides access to private land.

3.15.1.16 FOREST ROAD 296 AND ASSOCIATED SPURS

This system of roads was constructed as part of the transportation system for the Bear Creek and Garkane Timber Sales. They were constructed of native material and are presently travelled by four wheel drive vehicles and OHVs.

3.15.1.17 FOREST ROAD 429

This is a gravel surfaced road which provides access to Garkane's lower power plant.

3.15.1.18 FOREST ROAD 430 AND ASSOCIATED SPURS

These are roads which junction with Forest Road 153. These roads are constructed of native material and are associated with past timber harvests.

3.15.1.19 FOREST ROAD 514

This is the Road Draw Road. It was constructed with native material. Portions are steep with poor drainage. Travel is by four wheel drive vehicles or OHVs. Historically it was part of the a route connecting Loa in Wayne County with the town of Boulder. It is pronounced by the County to be eligible for RS 2477 consideration.

3.15.2 ROAD DENSITY

The open road density within the analysis area is 1.26 miles per square mile. This computation is based on data obtained from GIS produced maps.

3.15.3 CUMULATIVE EFFECTS AREA (CEA)

The cumulative effects area for travel management is the analysis area itself. The transportation system was initially developed by the early settlers to meet their needs for maintaining the irrigation system, livestock management and travel needs. More recent developments were made in conjunction with land management activities most notably timber harvesting.

Off site impacts of sediment due to road reconstruction, road closures, or changes in use are discussed in the recreation, wildlife, soils and hydrology sections of this document.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 NO ACTION

4.1.1 EFFECTS OF NO ACTION ON VEGETATION

4.1.1.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON VEGETATION

Forest Ecosystems

Ecosystems

Very little change in the **mountain grassland** type is expected to occur in the foreseeable future (5-10 years). Continued loss in range from encroachment by both aspen and conifer trees would continue. Since current conditions do not favor fire spread, effects from fire behavior is not anticipated.

Sagebrush areas would continue to be characterized by dominance in the mature age classes for sagebrush with minimal grass/forbs underneath or between sage plants. Loss in range to encroachment by pinyon pine and juniper would continue. The risk to fire would increase with plant decadence. Effects from such fire would reduce the older age classes and provide site conditions suitable for both sagebrush and grass/forbs regeneration.

Within the **PJ** zone little change in stand conditions would occur in the foreseeable future, barring a major disturbance such as fire for most of the area. Because of the slow growth rates associated with the pine and juniper, little change in size classes would be noticed. Canopy cover and basal area would slowly increase, reducing understory vegetation. As stand basal areas increase, risk of a stand replacing fire increases which would have the effect of converting stands back to the seral stage dominated by annuals (Gottfried, 1993, 1996). In addition, extended droughts coupled with stand basal areas exceeding 100 sq. ft. would increase the likelihood of an Ipps confusus bark beetle infestation (Wilson and Tkacz, 1993). An exception to these conditions, is the treatment of 100 acres associated with the LBS Vegetation Treatment Project which will create a more open savannah appearance with increased understory vegetation using cutting and prescribed fire methods (LBS Vegetation Treatment Project, Chapter 4, page 29) .

With continued lack of fire in the **oak** brush, clones would continue to increase both in individual stem size and area of clone. Existing conifers within the clones would increase canopy cover and contribute to the establishment of additional conifer seedlings. These changes would reduce oak stems surrounding the individual trees. As the oak stems mature, their ability to sprout following fire would decrease (Clary and Tiedemann, 1993). Age class diversity would be limited to the 70 acres of recent stand replacement fire versus the remaining oak clones. However, should a fire occur in the near future, clones would be rejuvenated with new sprouts and loss of conifer trees.

The **mountain mahogany** stands would increase in age and density as the recent fire disturbed areas fill in with plants. Some loss in range would occur as adjacent ponderosa pine and Douglas-fir trees provide seed for regeneration into the brush. These changes would increase the risk to fire, which would provide the disturbance necessary for age class diversity and maintain this type in properly functioning condition.

Effects on the **ponderosa pine** would be different based on past harvest activity. Stands previously harvested would continue optimum tree/stand growth with minimal impact from insects or diseases. As these trees mature, increasing seed production and open stand conditions would facilitate increasing natural regeneration, eventually producing greater age class structure. Implementation of the ponderosa pine treatments associated with the LBS Vegetation Treatment Project including 59 acres of group selection and 188 acres of understory burning will create greater age class diversity and reduced fuel loadings (LBS Vegetation Treatment Project, Chapter 4, page 29-30) . The un-harvested stands would face increasing mortality in the mature pine overstory due to both age related stress and competition from the understory. Most likely this mortality would occur during drought periods which further stresses the trees, providing conditions for bark beetle activity (Mattson and Haeck, 1987). Stand conditions are increasingly suitable for establishment of the more shade tolerant conifers, namely Douglas-fir and white fir, thereby outcompeting ponderosa pine and eventually leading to conversion of the forest type (Covington and Moore, 1994).

Aspen would have the greatest change in stand conditions. Since most stands presently have advanced regeneration to immature conifers underneath, lack of disturbance would convert the stands to Douglas-fir and subalpine fir (Perala, 1991). These changes would be readily apparent in approximately 20-40 years (Based on observations documented in reconnaissance notes). Once conifer trees attain canopy height, the shade intolerant aspen decline (Mueggler 1989). Stands currently typed as aspen climax would eventually convert to conifer types with successful regeneration of conifer trees into the stands from either adjacent seed sources or existing trees within. A large disturbance, such as fire would convert the stands back to the seral stage dominated by aspen sprouts (Brown, 1985). An exception, is 64 acres of aspen treatments associated with the LBS Vegetation project which would result in 32 acres of aspen harvest and 32 acres of prescribed fire regeneration treatments scattered in across the area (LBS Vegetation Treatment Project, Chapter 4, page 30) .

For the **mixed conifer** zone, overtime, mature Douglas-fir/ponderosa pine trees would die-off and be replaced by the increasing immature subalpine or white fir (Covington, 1973). Once this occurs, the stands would be dominated by high density levels of subalpine fir until a major disturbance such as fire, insects or disease eliminates or reduces the fir, providing favorable site conditions for establishment of aspen, ponderosa pine and Douglas-fir.

The **spruce/fir** type would continue to reduce stand composition diversity as high stand densities promote subalpine fir dominance over aspen and Engelmann spruce. Stand structure would remain uneven-aged, with development of an older age class of spruce leading to better balance. As stand densities increase, site conditions would lead to greater subalpine fir. The greatest overall potential change to the area as a whole in effects would be if a large stand destroying event such as fire spread throughout the area. Since stand conditions are moving towards greater opportunities for a stand destroying fire for most of the area this effect would result in substantial changes in the area. Diversity would be tilted back to early seral stages of stand development, primarily the grass/forb and aspen suckering stage.

Ecosystem Health

Continued lack of disturbance within the analysis area would further increase stand densities, forest floor accumulations, conversion of aspen to conifer, and mortality throughout. These changes would result in increasing the destructive potential of wildfire eliminating the forest cover at the landscape level and the imbalance of resources and diversity of seral stages and stand structures (Kolb, Wagner, and Covington, 1994). Such abnormal disturbances, have a dysfunctional effect on the ecosystem because the regeneration power of the plant communities is reduced through loss of site protection, seed sources, and soil (Steele, 1993). Some improvements would occur as the various vegetation treatment projects associated with the LBS Vegetation Treatment Project are implemented (LBS Vegetation Treatment Project, Chapter 4, page 30 which mimic the effects of natural disturbances associated with the historic fire regime).

Stand Health

Little change in insect or disease activity would be expected within the PJ zone. As stand densities and tree ages increase, some mortality would be expected, especially in the oldest age classes. The 100 acres of treatment associated with the LBS Vegetation Treatment Project would experience little, if any insect/disease activity (LBS Vegetation Treatment Project, Chapter 4, page 30-31).

Existing dwarf mistletoe infection levels and area would be expected to increase within the ponderosa pine and mixed conifer belts (Parmeter, 1978). These locations would persist indefinitely, reducing stand densities, growth rates, and large diameter trees (Filip, 1993). Bark beetle activity would remain (Wilson and Tkacz, 1993), focusing on the overstory mature pine trees. Activity would most likely remain at endemic levels, removing individuals or small clumps. Implementation of the ponderosa pine treatments (groups selection and understory burning) would improve the overall health of both the treated and adjacent stands (LBS Vegetation Treatment Project, Chapter 4, page 31).

Since most aspen stands have reached a state of decline, disease activity would remove most of the individuals within the mature clones. Density related mortality would occur at increasing levels in overstocked stands. Many of the aspen stands would succeed to conifer types. Aspen regeneration would occur as the overstory declines, with survival rates dependent on stocking and browsing pressure. Implementation of the 64 acres of aspen regeneration associated with the LBS Vegetation Treatment Project would offset these trends by creating areas of aspen regeneration and reduced conifer encroachment (LBS Vegetation Treatment Project, Chapter 4, page 31).

Productivity

Within the pine belt, the previously harvested stands would continue optimum tree/stand growth (Ronco, 1985) at site potential due to past stand density control. Implementation of the group selection treatments (LBS Vegetation Treatment Project, Chapter 4, page 31) would create temporary gaps in stocking levels reducing stand growth below site potentials until regeneration re-stocks the areas. Stands not previously harvested are at that point now whereby mortality is occurring, primarily in the oldest age classes first. As the trees die, gaps in the stand are created which cannot be immediately filled in by either surrounding trees or regeneration. Surviving trees would have declining vigor and loss of crowns. Implementation of the 188 acres of understory burning would reduce understory competition and overstory mortality (LBS Vegetation Treatment Project, Chapter 4, page 31). With lack of fire disturbance, invasion of white fir or Douglas-fir will increase in the cooler pine sites with adjacent seed sources, as the understory setting becomes more suitable for the

more shade tolerant species. This habitat conversion can presently be seen in stands such as Location 22 stand 52.

Within the aspen zone, many stands would be converted to conifer habitat types as the existing understory conifers gain dominance in the overstory (Mueggler, 1983). Conifer growth would be at optimum stand levels until density related mortality occurs due to the high stocking levels. The 64 acres of aspen regeneration treatments would result in loss in full site utilization for approximately 15-20 years until stocking rates return to full site potential (LBS Vegetation Treatment Project, Chapter 4, page 31).

Within the mixed conifer zone, stand growth rates would decrease as densities are approaching the zone of imminent mortality (Long, 1985). This competitive stress would remove the older Douglas-fir/ponderosa pine. Primarily subalpine fir/white fir would occupy these sites which are not capable of attaining the growth rates and size of the Douglas-fir or ponderosa pine.

Similar changes would also occur to the spruce/fir type, as density levels are high enough to induce mortality against the older Douglas-fir and Engelmann spruce. Mortality gaps would provide site conditions for their regeneration, unless subalpine fir occupies the understory. Overall, subalpine fir would increase.

Vegetative Structural Stage (VSS) Distribution

The McGath NA would continue with slow tree growth rates due to high stocking levels, loss of the aspen component to conifers, and high canopy cover. Subalpine fir and Engelmann spruce would increase into the larger VSS classes, with the spruce capable of attaining the largest sizes. Continued high stand densities may prevent the spruce from attaining the VSS 6 before maturity. Eventually the subalpine fir which dominates the seedling-sapling component would replace the spruce. The Sand Creek NA, found within the ponderosa pine belt would experience two separate stand changes. Two stands which compose 68 acres of the total 187 NA acres are riparian sites composed of aspen and pine. Eventually, the aspen trees would be replaced by the understory ponderosa pine immature saw-timber. This would result in temporary losses in canopy cover, stocking, and nesting trees but would eventually allow for achievement of the VSS 5 and 6 classes. The other stands are dominated by ponderosa pine which would further respond from past harvest activities, increasing in canopy cover, stocking, and size.

The McGath PFA area would incur similar changes as described for the NA. The greatest difference would occur in 290 acres of the 453 acre PFA area which are stands dominated with an overstory of aspen. These stands would change substantially as the aspen component is replaced by the subalpine fir. This change would have temporary losses in canopy cover, stocking, and mature trees until the subalpine fir attains maturity. The Sand Creek PFA would increase in stocking, canopy cover, and size classes as the stand recovers from past harvest practices. Because these stands are even-aged, the VSS distribution will continue to be imbalanced, but would increase into the larger VSS classes. Seral aspen clones found throughout the pine would eventually be replaced by ponderosa pine.

The FA would change based on forest type and harvest history. The harvested pine (2,329 acres) would continue with optimum tree/stand growth for approximately 20-30 years until density competition reduces tree growth. During this time canopy cover and tree size would increase. VSS classes would still retain an imbalance due to the even-aged stand structure. Implementation of the group selection and prescribed fire treatments associated with the LBS Vegetation Treatment project would create an additional VSS class 1 and improve long term retention of the mature ponderosa pine (LBS Vegetation Treatment Project, Chapter 4, pages 31-32). Unharvested pine stands (2,337 acres)

would experience growth loss and mortality in the largest VSS classes due to density related competition and mature age. Canopy cover would remain high except for temporary gaps created by tree mortality. If stand densities remain high, growth rates on the immature trees would not be sufficient for these trees to attain the maximum diameter size before maturity (Covington and Moore, 1994).

The mixed conifer type (1560 acres) has high densities and increasing dominance of the more shade tolerant species. This will mean, loss of the large diameter seral species (ponderosa pine and Douglas-fir) to immature white fir and subalpine fir. With lower growth rates and earlier maturity ages of the fir, most stands will not be capable of producing the largest VSS classes. Canopy cover would remain high. Regeneration would be limited to existing openings or openings created from mortality gaps at levels to meet VSS 1 and 2 objectives. Aspen would decrease in presence. Aspen stands (2,131 acres) would convert to conifer habitats dominated by subalpine fir. Scheduled aspen regeneration treatments on 160 acres would create opportunities for recruitment of VSS 1 aspen and maintain aspen dominance over a longer period The recent LBS decision would develop uneven-aged conifer stands, as well as restore aspen, oak, and pinyon-juniper stands closer to historical conditions. Ponderosa pine trees growing within the oak stands would increase in distribution with additional regeneration and maintain optimum tree growth rates.

Forest Land Suitability

Under the No Action Alternative, there would not be any change in suitability as described in Chapter III.

Old Growth

Changes in the old growth pinyon pine should occur more slowly, with stands retaining old growth status, given the low rate of mortality. Implementation of the 100 acres of treatment in the pinyon/juniper would result in loss of old growth (LBS Vegetation Treatment Project, Chapter 4, page 32).

Young stands (mixed conifer, aspen, and ponderosa pine) would continue towards developing the old growth habitat characteristics including maturity and some degree of decadence. Within the young ponderosa pine stands for example, most of which are dominated by the 60-80 year old component (RMRS data for locations 30, 31, 33, 34, and 45), qualification would not occur until the trees are at least 200 years old.

The mixed conifer and portions of the ponderosa pine which now meet old growth requirements would continue in the short term as old growth. Because the mature overstory component is presently showing signs of mortality and decadence, loss of these trees would require recruitment from younger age classes to provide future habitat. Such recruitment is contingent upon the ability of the stand to provide a variety of age classes of ponderosa pine and Douglas-fir. Continued lack of disturbance creates site conditions unfavorable to regeneration these species and coupled with high stand densities, suppresses diameter growth rates to attain the large old trees (Covington 1994, Covington and Moore, 1994).

The larger risk is posed by increasing homogeneity of stand conditions across the project area which places the area at risk to widespread disturbance. This disturbance, if stand replacement, could result in widescale loss of old growth habitat (Covington, 1994).

4.1.1.2 CUMULATIVE EFFECTS OF NO ACTION ON VEGETATION

Forest Ecosystems

Ecosystems

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. These boundaries represent a geographically distinct boundary, representative of the project vegetation zones, and contain future actions which may potentially influence proposed actions. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands, as well as restore aspen, oak, and pinyon-juniper stands closer to historical conditions (LBS Vegetation Treatment Project, Chapter 4).

The greatest potential change in effects would be if a large stand destroying event such as fire spread throughout the area. Since stand conditions are moving towards greater opportunities for a stand destroying fire for most of the area this effect would result in substantial changes in the area. Diversity would be tilted back to early seral stages of stand development, primarily the grass/forb and aspen suckering stage. Another potential change would be loss of current aspen and seral dominated mixed conifer stands which contribute to the varied ecosystems. Long term changes could include conversion of oak brush stands into ponderosa pine dominated systems.

Continued succession of stands in the absence of major disturbances such as stand replacement fire, would result in simplification of the area from loss of stands dominated by aspen, ponderosa pine, Douglas-fir and conversion of oak brush stands into conifer tree species dominated systems. An assessment of the forest inventory completed in 1995 for the Dixie National Forest estimates that currently only 35% of the historical aspen type are dominated by aspen (O'Brien and Brown, 1998).

Ecosystem Health

Continued lack of disturbance within the watershed areas would further increase stand densities, shade tolerant species, forest floor accumulations, loss of certain ecosystems (oak, seral species dominated mixed conifer, and aspen) and mortality throughout. These changes would result in further simplication of the area , increasing both the destructive potential for wildfire eliminating the forest cover at the landscape level and the imbalance of resources, while decreasing the diversity of seral stages and stand structures (Covington 1994).

Most likely the spruce/fir belt would be more susceptible to disturbance from a spruce beetle epidemic followed by fire than just fire (Bradley, Noste, and Fischer). Its position on the plateau would provide protection from fire spread from the sub-watershed below.

Stand Health

The area of analysis for the cumulative effects would be the Sand Creek and Bear Creek sub-watershed. Past timber sales have emphasized reduction of dwarf mistletoe infection levels as well as reduction in stand densities and tree ages to promote individual tree health and risk to bark beetle infestation. The recent LBS decision would develop uneven-aged conifer stands, as well as restore aspen, oak, and pinyon-juniper stands closer to historical conditions (LBS Vegetation Treatment Project, Chapter 4, pages 30-31).

With continued lack of disturbance, the potential for insect/disease activity increases, the risk to adjacent healthy stands increases. Stands with highest density levels and/or age classes could provide

a source for infection or infestation into surrounding areas. An example would be dwarf mistletoe infection centers could provide sufficient beetle susceptible trees to build-up populations which then fly into adjacent stands. An additional threat is these mortality centers providing snags/fuel for wildfire which carries into surrounding stands (Knight, 1987).

Productivity

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek subwatersheds. Past harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands, favoring the same species, over longer rotation . (LBS Vegetation Treatment Project, Chapter 4, page 31).

The greatest potential change in effects would be if a large stand destroying event such as fire spread throughout the area. Since stand conditions are moving towards greater risk for stand destroying fire for most of the area, this effect could result in substantial changes in the area. Productivity would be reduced by loss of stocking, seed sources, (Pine Canyon fire) and species alteration. Although this impact would result in enhancement of site conditions for eventual establishment of seral species which are capable of greater growth rates and sizes, long term understocking would maintain sites well below potential.

Vegetative Structural Stage Distribution

The area of influence for the cumulative effects analysis is the project area divided into the various goshawk management areas for the three nest areas located within the project area (project file, vegetation). Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands as well as regeneration of aspen, with the intent to develop stands towards northern goshawk habitat (LBS Vegetation Treatment Project, Chapter 4, pages 31-32) . These activities were designed to improve existing conditions towards the desired future condition for northern goshawk, by emphasizing a younger age class of seral pioneer species.

The greatest potential change in effects would be if a large stand destroying event such as fire spread throughout the area. Since stand conditions are moving towards greater opportunities for a stand destroying fire for most of the area this effect would result in substantial changes in the area. VSS distribution, canopy cover, openings, and down woody debris would move away from the desired conditions. Snags and future dead and down logs would increase. Species composition would improve as seral species would increase, although this may occur over the long term depending on fire severity.

Forest Land Suitability

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek subwatersheds. Past timber harvests did not classify lands for timber suitability. The recent LBS decision included classification of land for timber suitability. There would be no effect.

Old Growth

The area of influence for the cumulative effects analysis is the following drainages which encompass the project area, along with existing old growth. Using GIS technologies, the project area was

delineated into drainages which were then identified by site as to old growth habitat using; past inventories (LBS and Jacobs/Swale), RMRIS data, aerial photo interpretation, and reconnaissance data. Results are as follows;

Table 4.1.1 Old Growth by Drainage

Drainage	Total acres	Old Growth acres	% Old Growth
Big Hollow	3,872	2,258	58
Dry Hollow	735	19	3
Pretty Tree	1,535	425	28
Side Hollow	3,038	245	8
Lake Creek	14,845	4,143	28
Bear Creek	8,030	1,381	17
Upper Sand Creek	14,582	2,678	18
West Fork Boulder	14,917	1,298	9
Middle Boulder Creek	3,393	362	11
Total	64,947	12,909	20

Implementation of the LBS Vegetation project would reduce old growth habitat within the Lake Creek drainage by 100 acres of pinyon/juniper, resulting in 4,143 acres of old growth or 28%. The Dry Hollow drainage is below the forest plan standard for a minimum 7-10 percent within a drainage. This particular drainage of 735 acres is composed of 374 acres of non-forest with the remaining 361 acres being pinyon/juniper. The largest site, 150-4 is 342 acres, representing a dry canyon which, overall lacks the density required to meet old growth habitat.

The greatest potential change in effects would be if a large stand destroying event such as fire or insects spread throughout the area. Since stand conditions are moving towards greater opportunities for a stand destroying fire for most of the area this effect could result in substantial changes in the area. Diversity would be tilted back to early seral stages of stand development, primarily the grass/forb and aspen suckering stage. Second, loss of the mature component to insect activity due to stress could reduce current old growth habitat since so many stands are relying on the old Douglas-fir and/or ponderosa pine to meet the old growth stipulations. Many stands of old growth aspen could succeed to early stages of conifer.

4.1.1.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be a loss in the opportunity to improve vegetation conditions in terms of ecosystem health, mortality rates, individual tree growth as well as stand level growth.

Short Term vs. Long Term Productivity - The decision not to implement proposed treatment activities would allow vegetation conditions to progress as detailed in this section. Long term productivity may decline should large scale losses from insect, disease, or fire occur.

Irreversible/Irretrievable Commitments - The opportunity to improve vegetation conditions would be irretrievably lost. Succession of vegetation types (sagebrush to pinyon/juniper), tree species (aspen to conifer), reduction of tree or stand growth, ecosystem diversity, old growth aspen would represent an irretrievable loss. However, since the potential to re-establish these conditions remains, there would be no irreversible loss.

4.1.2 EFFECTS OF NO ACTION ON RECREATION

The recreation resource and in effect the forest visitor experience can be affected by changes to the characteristics of the area and changes to the facilities. Perception of a management activity vary depending on the biases of the individual, making objective measurements to change difficult. The environmental consequences disclosed in this section are presented subjectively.

4.1.2.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON RECREATION

In the short term (5-10 years), the conditions described in Chapter III - Affected Environment would prevail over most of the area. The amount of recreation use in the area would continue to increase in response to the publicity the area is receiving as part of the Highway 12 Scenic Highway experience and its location relative to the Grand Staircase-Escalante National Monument. Driving for pleasure in conjunction with sight seeing would continue to be the most popular recreation pursuit (DNF, LRMP).

In the long term the loss of the aspen stands, as described in the Vegetation Section of this chapter, would have the most effect on recreation use in the analysis area. A loss of the visual variety provided by the aspen would directly effect those recreation activities where viewing of the scenery is an integral part of the recreation experience. This impact would reduce the number of people using the area, causing them to move elsewhere on the district or leave the area entirely.

Under No Action, there would be no conflict with the Land and Resource Management Plan for the Dixie National Forest. However, the opportunity to move the analysis area towards the Desired Future Condition as described in Chapter 1 would be lost.

4.1.2.2 CUMULATIVE EFFECTS OF NO ACTION ON RECREATION

The Cumulative Effects Area as described in Chapter 3 identified the past, present and future management activities in the CEA. The combination of these activities would have only limited and isolated effects on recreation use in the area. However, should No Action result in the loss of substantial portions of the aspen vegetation type, those recreation uses in which scenery viewing is an important component would be expected to decrease.

4.1.2.3. OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Since there are not recreation management activities proposed with No Action, There would be no irreversible or irretrievable commitment of resources.

4.1.2.4 EFFECTS OF NO ACTION ON WILDERNESS

There are no resources management activities proposed under No Action. There would be no direct or indirect effects on the Box-Death Hollow Wilderness Area.

Direct and Indirect Effects of No Action on Wilderness

No Action would not effect the character of the Box-Death Hollow Wilderness Area. Conditions as described in Chapter 3 would continue.

Cumulative Effects of No Action on Wilderness

The Cumulative Effects Analysis (CEA) in Chapter 32 describes the past, present and future management activities in the CEA. Some of these activities, such as timber harvesting and road construction, which occurred prior to the establishment of the wilderness did affect the land character. The combined effects of the past, present and future management activities would not effect the existing character of the Box-Death Hollow Wilderness Area.

Other Effects Required by Council of Environmental Quality (CEQ) Regulations

There are no management activities proposed under No Action.

4.1.3 EFFECTS OF NO ACTION ON ROADLESS/UNDEVELOPED RESOURCES

INTRODUCTION

This section describes the effects, of No Action, on the roadless/wilderness attributes of natural integrity/apparent naturalness, solitude/primitive recreation, special features, and manageability/boundaries. Please refer to Section 4.2.3 for a complete discussion of the analysis methods to be used and to view a table summarizing effects. Effects will be disclosed as they relate to 1) Inventoried Roadless Areas (IRAs) and 2) Other Undeveloped/Unroaded lands.

4.1.3.1 DIRECT AND INDIRECT EFFECTS

The No Action alternative would result in no development in any IRAs or Other Undeveloped/ Unroaded Areas and would have no effect on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider any roadless/undeveloped lands for inclusion into the National Wilderness Preservation System. Existing activities would continue and the present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected mainly by ecological processes.

4.1.3.2 CUMULATIVE EFFECTS OF NO ACTION

Under No Action, there would be no known cumulative effects on IRAs or Undeveloped/Unroaded Areas. In the foreseeable future, it is possible that the anticipated Donkey/Park Ridge Vegetation Project on the Teasdale District may develop several hundred acres of the Boulder Mountain/ Boulder Top/Deer Lake IRA. Both the final Roads Rule and the presidents recent roadless initiative are reasonable foreseeable future actions that may affect the number of acres within the CEA.

4.1.3.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Road building and associated maintenance in a roadless area is an irreversible commitment of the resource to a developed condition for the long-term. No Action would have no irreversible or irretrievable effects on the roadless/undeveloped resource.

4.1.4 EFFECTS OF NO ACTION ON VISUAL QUALITY

Effects on Visual Quality by the various actions is measured by the amount of visual changes that would take place and their duration. Achieving long-term visual quality goals in a forest environment is a dynamic process. Vegetative treatments sometimes cause temporary periods of

unacceptable visual changes, therefore it is important to plan actions so that an attractive sequence of views is maintained and Visual Quality Objectives (VQO's) are met.

Following is a discussion of the effects of No Action on the visual landscape within the Pretty Tree Bench Prescribed Fire Project area viewshed. The discussion will be in terms of the effects on the visual elements (form, line, color and texture) expected.

4.1.4.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON VISUAL QUALITY

Guidance for this section is found in the Visual Management System, Agriculture Handbook No. 462, NFLM, Vol. 2. No Action would treat none of the 33,929 acres in the analysis area and the effect would be that natural succession would continue and eventually culminate in a conifer dominated forest. The forest would lack visual variety because of the reduced number of aspens as well as lack of size classes in other species.

Visual Quality Objectives (VQO'S)

The VQO's for No Action would be the same as presently exist.

Landscape Character

No Action would cause no short-term changes in landscape character in the analysis area. In the long-term, however, the character of the stands would change to a more dense condition. The forest would be more compact and dark because of the extra overstory and would display less visual variety. This visual condition would persist until a major insect or fire disturbance occurs. With a major disturbance, landscape character would change drastically in the negative with decreased forest cover and increased erosion, sedimentation and stream degradation.

Dominance Elements

Dominance elements are the simplest visual recognition parts which make up the characteristic landscape. An observer sees landscapes in terms of form, line, color and texture which usually descend in potential visual strength in the order shown.

Form: This visual element is usually dominant because of the vast scale involved. Examples in the project area are the rocky ridges and the steep Sand Creek drainage basin. No Action would cause no effect to the land and water forms of the project area.

Line: Live trees and snags provide important vertical line values to the forest landscape. In other instances, horizontal lines such as those made by a road bed, road cuts or fills present an unnatural contrast with the forest floor. With No Action, there would be no effect on line values. Any existing road scars currently visible would remain.

Color: The color element in the landscape would be reduced substantially in the long term with No Action. The grayish brown color of snags would continue to contrast with the dark green conifers but the grayish white trunks, spring greens and fall yellows of the aspen would diminish as they are replaced by the spruce-fir forest. Continued encroachment of the pinyon/juniper community on the sage community would eventually result in a dense, monotonous covering over the landscape. Any residual brown slash, white sawed log ends and black partially burned slash and root wads present in road and trail foreground zones would, with this action, remain.

Texture: Under the No Action alterative, the existing vegetative texture would remain in the short term and move toward less textural variety in the long term. Any future openings in the increasingly dense forest landscape would be more noticeable.

Summary: The desired VQO's would not always be met within the foreground and middleground of primary roads and trails in the analysis area because of debris left from previous sales or treatment activities. Under No Action, the VQO's would remain as at present. No Action would not conflict with the LRMP but would not move the project area toward the desired future condition because visual diversity would not be increased.

4.1.4.2 CUMULATIVE EFFECTS OF NO ACTION ON VISUAL QUALITY

With this alternative, the analysis area would remain visually attractive to recreationists. There would be no cumulative visual effects from other nearby vegetation treatment projects because topoghaphic barriers prevent cross viewing from the major travel corridors. If the Hell's Backbone Road is someday officially designated as a national scenic backway, an increase in visitor use would occur, possibly accompanied by an increase in site degradation. Other cumulative effects on the visual resource would be those described in Alternative C of the Sand Creek Soil Stabilization Project EA.

4.1.4.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

With No Action, unexpected events such as major wildfires and/or other disturbances would change the visual setting in a dramatic manner. The extent of alteration would depend on the event itself. Projections for visual quality in the analysis area can be made in a general way. It would be expected that existing visual quality would, over time, diminish through natural ecological processes as long as fire suppression activities continue. As the coniferous forest replaces the aspen, visual variety in form, line color and texture would be reduced. Lack of size variety in other species would be perpetuated under No Action. No Irreversible or Irretrievable effects would occur to visual quality as a result of No Action. Natural processes such as fire, wind, drought, and natural succession would continue.

4.1.5 <u>EFFECTS OF NO ACTION ON SOILS</u>

4.1.5.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON SOILS

On-Site Soil Erosion

On-site soil erosion would continue at current rates as described in the "Affected Environment" section of the NEPA document. Under the No Action alternative tree removal and prescribed burning would not occur. The condition, processes, and trends described in the Affected Environment, section 3.6 would continue if the No Action alternative is selected.

Long Term Soil Productivity

As described in the "Affected Environment" section of this document, under current conditions, the majority of the soils in the Analysis Area have low erosion rates. Some of the soils in soil map units that have formed from sedimentary rocks have moderate erosion rates. Soils on a majority of the

project area are meeting soil quality standards. All areas being analyzed for treatment under this project currently meet soil quality standards.

Forest Plan Consistency

This alternative is consistent with the Land and Resources Management Plan of the Dixie National Forest. This alternative would not provide the opportunity to move the analysis area toward a desired watershed condition.

4.1.5.2 CUMULATIVE EFFECTS OF NO ACTION ON SOILS

There are no cumulative effects on the soil resource with the No Action alternative.

4.1.5.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

There are no adverse effects, effects on short term vs. long term productivity or irreversible or irretrievable commitment of resources to the soil resource under the No Action alternative.

4.1.6 EFFECTS OF NO ACTION ON WATERSHED

Introduction

Watershed resource effects include effects on the water resource and beneficial uses of water that occur both at the site (direct effects) and away from the location of the actual land management activity and transmitted through the fluvial system (indirect effects). Impacts result from the combined effects of one or more management actions within a watershed. Cumulative effects may result from changes in watershed hydrology; sedimentation rates (landslides and/or surface soil erosion); and temperature and chemistry.

4.1.6.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ALTERNATIVE ON WATERSHED

Water Quantity and Streamflow Regime

The existing condition and trends described in the Affected Environment Section (3.6) would persist. Without implementation of any of the (action) alternatives the risk of catastrophic fire, and associated watershed impacts, would increase.

Water Quality

The existing condition and trends described in the Affected Environment Section (3.6.1) would persist. The vegetative treatments described in the action alternatives would not occur and the risk of catastrophic fire, loss of vegetative cover and associated increase in short term and long term sedimentation would increase. Transportation management actions would not occur and the water quality impacts from improperly maintained and located roads would continue.

Forest Plan Consistency

This alternative is consistent with the Land and Resources Management Plan of the Dixie National Forest. This alternative would not meet the purpose and need of any of the action alternatives.

4.1.6.2 CUMULATIVE EFFECTS OF NO ACTION ON WATERSHED

The existing condition and trends described in the Affected Environment Section (3.6.1) would persist. The vegetative treatments described in the action alternatives would not occur and the risk of catastrophic fire and cumulative effects to watershed would increase.

4.1.7 EFFECTS OF NO ACTION ON FISHERIES

4.1.7.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON FISHERIES

With no actions occurring, this alternative would not affect fisheries in the short-term. In the long-term, the potential for a large catastrophic fire in the analysis area would increase, due continued increase of ground and ladder fuels in the forested habitats. A potential large wildfire, particularly a high-intensity fire, would indirectly affect the fisheries by large quantities of sediment delivered to the streams until such burn areas recovered with adequate vegetation.

Forest Plan Consistency

This alternative is consistent with the Land and Resources Management Plan of the Dixie National Forest. This alternative would not provide the opportunity to move the analysis area toward a desired watershed condition for fish habitat.

4.1.7.2 CUMULATIVE EFFECTS OF NO ACTION ON FISHERIES

The area of influence for the cumulative effects analysis is the watersheds of the Sand Creek and the Boulder Creek drainages. The conditions described in the WATERSHED CUMULATIVE EFFECTS section of this chapter and in the SOILS AFFECTED ENVIRONMENT chapter would continue under this alternative.

4.1.8 EFFECTS OF NO ACTION ON WILDLIFE

4.1.8.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON WILDLIFE

General Habitat Conditions

Implementation of this alternative would not incur any changes to wildlife habitats and associated wildlife and plant species in the short-term. Without disturbances, succession of the vegetation zones associated with the principal habitats would continue in their current stage of succession with little diversity provided by young and mid age-class conditions. In the long-term, all habitats would achieve a near uniform mature/old age-class, accommodating wildlife and plants species associated with such age-class conditions. Little to no diversity of wildlife and plant species associated with younger age-class habitat would be provided, until such time that a natural or man-caused disturbance occurs.

The **aspen habitat** would continue to be comprised mainly of mature to old growth characteristic, providing habitat for wildlife species associated with such into the near future. As conifers continue to encroach the aspen stands, wildlife species associated with pure aspen stands would be disfavored to species that utilize conifer-aspen mixed stands. Then, as conifers become the dominate species within those stands, the guild of wildlife species would change again, to a guild that favors conifer

habitats. Populations of wildlife and plant species associated with the hardwood aspen habitat would diminish in the analysis area as acres of aspen habitat diminish with dominance of conifers.

The small percentage of young seral age class would progress to a mid-age class habitat characteristic, leaving minimal to no acreage in habitat conditions of the young age-class, and resulting in a deficit of young age-class conditions and associated wildlife and plant species. The overall diversity of habitat characteristics would be low, with a corresponding low diversity of wildlife and plant species associated with aspen habitat.

The **mixed conifer habitat** would continue to recruit an understory of true firs and loss of other understory vegetation, with a corresponding loss of suitability for wildlife and plant species that evolved with an open ponderosa pine/Douglas-fir habitat. Without disturbances, the establishment of true firs would eventually dominate the habitat and begin to encroach into the various interspersed meadows, leading to lower diversity in habitat characteristics and in wildlife and plant species.

With increasing density of true fir understory serving as ladder fuels into the overstory canopy and increased loading of woody fuels on the ground, an eventual wildlfire could result in a large stand replacement occurrence, eliminating the mature/old growth habitat component and creating a single-story young forest habitat, with minimal diversity of structure and wildlife species.

The **ponderosa pine habitat** would remain pretty much as existing. Diversity in the mid-age pine stands would remain low, with minimal horizontal and vertical structural diversity, and low diversity in the stand's wildlife, and low diversity in the stand's ground cover vegetation, in both species richness and age-classes of existing shrubs. The old growth stands of the pine habitat would continue to recruit an understory of young pine and firs and loading of woody fuels, setting a stage for a future wildfire to substantially reduce the acreage of this old growth condition of the pine habitat.

The **pinyon-juniper habitat**, without disturbance, would remain out of its natural range of variability, with continued encroachments into the sagebrush habitat and continued increase in stocking density on established sites. The result would be a continued loss to wildlife utilization and of native understory plant diversity within the pinyon-juniper stands.

The **oak habitat** would continue in its predominately mature age class. At the present time, this habitat is still relatively healthy. In the long-term, without disturbance to the habitat, continued encroachment by conifers would further reduce the forage value of this habitat for wildlife species and the health of this habitat.

The **sagebrush habitat** would continue to loose acreage to encroaching conifers, reducing habitat acreage for sagebrush associated wildlife and plant species. This alternative would continue the increase in older age-class of sagebrush with continued increase in sagebrush canopy closure and stocking density, further disfavoring the associated understory plant and wildlife species.

Open Road Density

This alternative would retain the existing 1.26 miles of open roads per square mile within the analysis area. The existing road traffic and disturbance to wildlife would remain relatively the same in the short-term. Long-term effect could result in increased disturbance should public use increase in travel on the existing open roads.

Management Indicator Species

This alternative would have no effects, in the short-term, to the Management Indicator Species inhabiting the analysis area. In the long-term without disturbances, the continued succession of the habitats would be unfavorable to the Management Indicator Species, and other wildlife and plant species associated with the MIS. An exception would be the northern flicker and other cavity nesting species, which would benefit in the long-term.

For **deer and elk**, this alternative does not promote the diversity of habitat conditions which would benefit these two species or a larger array of non-game species. This alternative would retain the current low forage ratio in the winter range and would not promote attainments toward the State's objectives for winter range forage in the pinyon-juniper or of reducing the conflict of deer and elk on private lands in the Salt Gulch area. In the long-term, available forage and quality of that forage would continue to decline, especially in several of the principal habitats. Quality forage in reasonable abundance and accessibility is a critical factor for most wildlife species, including deer and elk, to successfully breed and produce healthy offspring. With poor quality and low abundance of forage, the inverse is typically true. This alternative would lead to further deterioration in the forage conditions within the various principal habitats utilized by deer and elk.

The older age-class of the aspen habitat would continue to lose what available forage there is due to continued encroachment by conifers. The recently created young age-class aspen would grow out of forage condition when it exceeds browsing height. The pinyon-juniper would continue to spread and close canopy, eliminating further the quality and availability of understory forage. The oak would persist as a source of forage, though continuing to lose its yearly production of biomass and nutrient quality as the oak remains in a mature stage and over-topped by conifers. The low diversity of habitat conditions would also correlate to a lower diversity of various wildlife and plant species.

The **Merriam's turkey** would not benefit from the No Action Alternative. The turkey has a high dependency on young herbaceous vegetation for forage. As for the deer and elk, the quality of and abundance of forage would not be enhanced by this alternative and would, over the long-term, eventually diminish further, as the principal habitats continue toward mature and old growth conditions. The primary forage areas remaining for the turkeys would be the meadows intersperse in the mixed conifer habitat. These meadows are within the spring, summer and fall use-areas and would not be available during winters of heavy snow accumulation.

The **northern flicker**, and associated secondary cavity nesters, would not incur an effect in the short-term. The existing acreage of mature/old growth aspen would continue to provide suitable nesting trees across the stands of that habitat. As those aspen stands continue to age in the long-term, the density of suitable nesting trees (snags and defective green trees) would increase within the aspen habitat, as the aspen stands begin to deteriorate with age. In the long-term, as conifers continue to encroach and replace the aspen, the availability of suitable nest trees would eventually begin to decrease as the aspen fall out of the stands. In the pine and mixed conifer habitats, stress due stocking density would cause some mortality and defect, resulting in recruitment of available cavity trees in the long-term. These future conditions of high stocking densities also would provide the risk of a future large wildfire, which would provide an abundance of available dead trees for cavity nesting. However, this gained benefit would be short-term until the snags fall. Thereafter, a deficit of available cavity nesting trees would occur, and recruitment of available trees for cavity nesting would take many decades. This alternative would not provide a long-term stability of suitable habitat conditions, nor stable populations of the flicker and other cavity nesters.

The flicker and associated secondary cavity nesters utilize a diversity of habitats and conditions of those habitats for foraging. The diversity of habitat conditions would not be enhanced by this alternative, and would likely continue to decrease over time with this alternative, as each habitat continue toward an older age-class condition.

The **northern goshawk** is discussed below under the sensitive species section.

Threatened and Endangered Species

This alternative would have no effects to T&E wildlife and plant species or their associated habitats. With most of the principal habitats in mature to old age-class conditions and currently not inhabited by any T&E species, this alternative would have no measurable effects in the long-term. Occasional dispersal use by the bald eagle and Mexican spotted owl wouldn't change measurably. For the Mexican spotted owl, this alternative would not enhance the forested habitats for potential use as foraging habitat.

Sensitive Species

This alternative is not expected to cause a management concern for short-term population viability for any sensitive species. This alternative would not incur any impacts to Sensitive-listed wildlife or plant species, or their associated habitats, in the short-term. This alternative would not provide a long-term continuum of diverse habitat conditions, as varied age-classes, which could provide a diversity of foraging conditions for Sensitive-listed wildlife or provide site potential for Sensitive-listed plant species.

The **three-toed woodpecker** would be the only sensitive species within the analysis area which would benefit in the short-term and near long-term with its prey abundance increasing over time, as the mature forest habitats become decadent and prone to insect infestations. The magnitude of benefit might be marginal since the preferred habitat for this woodpecker is the spruce communities, which little exists within the analysis area. This woodpecker doesn't rely heavily on the pine and mixed conifer habitats. Aspen is used when in conjunction with spruce and subalpine fir habitat.

With the encroachment and increase in density of spruce and subalpine fir, mainly within the aspen habitat, habitat suitability would correspondingly increase for this woodpecker within the analysis area. However, as the principal forest habitats become less stable in the long-term, this alternative could provide for a "boom and burst" scenario for a local population if a large portion of the forested habitats within the analysis area and surrounding areas are subjected to stand replacement fires. The majority of the preferred spruce habitat exists at higher elevations atop Boulder Mountain and within the cumulative effects area.

The potential for a large stand replacement fire to burn into the spruce habitats within and immediate upslope from the analysis area would likely have the greatest localized effect to this species, with initial benefit of providing increased foraging opportunities for a few years and thereafter many years of non-habitat on those burned acres until the spruce forest recovered. Though a stand replacement fire might not be within the historic range of variability for the analysis area, such localized event would be of minimal effect to this woodpecker's population considering the large circumpolar range of this species.

For the **flammulated owl**, foraging suitability of the mixed conifer habitat and the old growth portion of the pine habitat would lessen in the long-term, as understory conifers continue to increase in

density. This owl prefers open forest conditions and rely heavily on insects as prey, commonly found associated with herbaceous vegetation. An increasing density of understory conifers would further depress the understory herbaceous vegetation as well as impede the owl's ability to effectively forage on the forest floor. In the long-term, the flammulated owl might benefit by an increase in availability of suitable nesting trees (snags and defective trees) as the understory conifers cause some mortality of the overstory larger trees in the mixed conifer and old growth pine stands and as mid-age pine begin to 'self-thin' due stocking density competition. However, the quality of foraging habitat would diminish for the owl as the forested stand increase in density and availability of prey decreases.

For the **Northern goshawk**, this No Action Alternative is not expected to contributed in the short-term to a loss of goshawk population viability within the analysis area. The habitat would deteriorate in the long-term, as described in chapter three, in reference to the State-wide assessment by Graham et al (1999). This alternative would not contribute to the *"Conservation Strategy and Agreement for the Northern Goshawk Habitat in Utah" (HCS)*, as described in chapter three. This alternative would closely resemble the No Action Alternative found in the environmental assessment titled *"Utah Northern Goshawk Project Environmental Assessment"* and would provide the least reduction in risk of habitat loss within the analysis area, by not reducing the density of the forested stands and not reducing the potential for large and intense wildfires.

This alternative would not promote desired goshawk habitat conditions in the various forested and woodland (pinyon-juniper) habitats. A diversity of habitat conditions and prey species across the analysis area would not be promoted. Existing diversity in habitat conditions would be less in the long-term as each forested habitat continues toward an older age-class condition and as spruce and fir continue to replace the aspen habitat. As described in chapter three, goshawk habitat in the analysis area would continue a trend toward unstability as the forested habitats progress toward denser stands and subject to insect and fire disturbances.

For the **spotted bat** and the **western big-eared bat**, this alternative would not have a measurable impact to individual bats or effect to population viabilities. These two species are not known to depend on this analysis area for essential roosting or wintering. If any foraging over the area does occur, such foraging would continue as is, with suitable foraging areas being over bodies of water for the western big-eared bat and existing openings (meadows and sagebrush habitat) for the spotted bat. This alternative would not promote additional or enhancement of any foraging suitability for the spotted bat, which favors openings versus older forested habitats.

The **Colorado River cutthroat trout** would not be impacted in short-term or long-term, with exception that a large catastrophic fire could have detrimental impacts to streams which might be reintroduced with this trout at a future date.

The **Dana milkvetch** would not be affected, beneficially or adversely, with this alternative. Option to develop management strategy for this plant would remain separately from any decision related to the Pretty Tree Vegetation Project. The **Jone's goldenaster** and the **Neese's peppergrass**, which are outside the analysis area, would not be affect by no action on Pretty Tree Bench Vegetation Project.

General Diversity Pattern

This alternative would not result in any short-term effects to the general wildlife and plant diversity in the analysis area. Principal habitats described above would progress further toward late seral age-

class conditions. A loss of diversity of habitat conditions would continue, with a diminishing diversity in wildlife and plant species associate with the early and mid age-classes of these habitats. Particular concern would be the loss in diversity of wildlife and plant species associated with the aspen habitat, as that habitat would gradually be replaced by conifers, until a stand replacement fire occurred.

Non-Native Wildlife and Plant Species

This alternative would not promote additional non-native species within the analysis area. Cheatgrass in the pinyon-juniper and sagebrush habitats would not be expected to measurably increase in density or area coverage in the short-term. As the pinyon-juniper stands increases in density and crown closure in the long-term, the presence of native understory species and their seedbanks in the soil would continue to decrease. The presence of cheatgrass would also likely decrease due the shading effect, though remain in the system (Goodrich and Rooks, 1999). In an extended long-term and continued decrease in native grasses, forbs and shrubs, and their seed banks, a proliferation of cheatgrass could be expected following a future natural fire.

Wildlife Corridor

This alternative would have no effects to current wildlife corridors, either migratory or dispersal, in the short-term. In the far long-term, this alternative would provide the future potential for a large-scale stand-replacing fire the forested habitats. Such a large-scale fire would not substantially affect seasonal migratory movement of the local big game and turkey populations between summer and winter range. Such a fire would reduce the existing dispersal condition for mid to late age-class habitat species while providing for suitable dispersal condition for species associated with a young age-class habitat condition.

Forest Plan Consistency

This alternative is consistent with the Land and Resources Management Plan of the Dixie National Forest. This alternative would not provide the opportunity to move the analysis area toward the desired condition for wildlife and plant habitats.

4.1.8.2 CUMULATIVE EFFECTS OF NO ACTION ON WILDLIFE

The area of influence for the cumulative effects analysis is the watersheds of Sand Creek and of Boulder Creek, that includes the analysis area and the immediate surrounding areas in the Sand Creek and Boulder Creek watersheds. This cumulative effects area is the same cumulative effects area considered for the effects to wildlife and plants by the Proposed Action and the other action alternatives.

General Habitat Conditions

The habitat conditions described in Chapter 3, Affected Environment, for Wildlife would remain as currently is, for the short term. Though **spruce/fir habitat** is not a significant portion of the analysis area and is not affected by any of the action alternatives, the cumulative effects area does encompass about 17,200 acres of this habitat, which constitutes about 20% of the cumulative effects area, and is the predominate forest habitat outside the analysis area at the higher elevations within the cumulative effects area. The No Action alternative would have no effects to this habitat. This habitat would

progress through succession as a dense forest habitat until a natural event, as an insect epidemic followed by fire, set the succession back to an early seral age-class condition.

The principal habitats of the analysis area, as described in Chapter 3 for Wildlife, also extends across the cumulative effects area at their respective elevational range for each habitat. The No Action alternative would have no short-term effects, directly or indirectly, to these principal habitats. The No Action alternative would not promote a diversity of habitat conditions within these principal habitats.

The **aspen** habitat would remain in a predominately older age-class condition. Encroachment of and density of conifers would continue to increase, resulting in loss of aspen habitat acres and species associated with such. This alternative would not provide a diversity of aspen age-classes, which would provide a long-term healthy aspen habitat with a diversity of wildlife and plant species.

The **oak**, **pinyon-juniper**, and **sagebrush** habitats would remain in predominately older age-class conditions. These older age-class conditions would provide a lower diversity of habitat conditions and a corresponding lower diversity of wildlife and of native plant species within the cumulative effects area than would be achieved by the action alternatives. Sagebrush habitat would continue to loose acreage to encroachment by the pinyon-juniper habitat, and a lesser extent to encroachment by the ponderosa pine habitat.

The **ponderosa pine** habitat and the **mixed conifer** habitat within the cumulative effects area beyond the analysis area resemble the same habitat conditions as in the analysis area. The pine habitat is predominately of mid-age condition, with pockets of old growth. The No Action would not provide fuels reduction. High levels of fuels in both habitats present a high potential for a large scale wildfire event across the cumulative effects area and corresponding loss of mature and old growth habitat conditions within the cumulative effects area. Diversity in age-class of understory brush would not be provided.

Open Road Density

The No Action alternative would not change the current open road density within the cumulative effects area or the period of seasonal closures.

Management Indicator Species

This alternative would have no effects to MIS within the cumulative effects area in the short-term. For **deer** and **elk,** this alternative would not provide an enhancement of forage. In the long-term, forage would lessen in availability and in quality as the principal habitats progress further toward older age-class conditions and as the pinyon-juniper continues to develop denser stands and continues to dominate the sagebrush habitat. Habitat for the **Merriam's turkey** would be similarly affected by the No Action alternative.

For the **northern flicker**, No Action would not have any short-term effects. The No Action would result in an increasing potential for a large scale wildfire in the long-term. Such wildfire would be beneficial with the creation of large acreages of snags. This beneficial effect would last until such snags fall. The effect afterwards would be large acreages without snags for this species and other cavity nesting species.

The No Action would not provide a diversity of habitat conditions and associated diversity of prey species for the **goshawk** and would not provide a stable continuum of habitat conditions over the long-term. In the long-term, the potential for a large scale fire would be detrimental to the goshawk by large acreage loss of mature to old growth forest habitat conditions.

Threatened and Endangered Species

The No Action alternative would have no effects to Federally-listed Threatened and Endangered species or to any species currently proposed for listing. No T&E or Proposed species are known within the cumulative effects area.

Sensitive Species

The No Action alternative would not incur any impacts to Forest Service, Region-4 Sensitive wildlife or plant species in the short-term, nor cause a downward trend in population viability for any sensitive species.

In the long-term, continued succession of the principal habitats would be beneficial to species as the **three-toed woodpecker**, as the forest habitats begin to produce larger numbers of defective and dead trees resulting from stress related to increased stand densities. Populations of this species and other cavity nesters would experience a period of high increase followed by a longer period of reduced population size. A potential large scale wildfire would be beneficial for this woodpecker, though such benefit would only last as long as the resulting snags and weakened trees were infested with bark beetle larvaes, roughly two to three years. After the population of bark beetles decline, the burn area would provide little foraging opportunity compared to a mature forest that's cycling dead and dying trees with new live trees. Additionally, after the fire killed trees fall, large acreages of such a burn area would be deficient of snags for nesting habitat before the new forest could recruit adequate large diameter trees for nesting structure.

The **flamulated owl** and the **northern goshawk** would not benefit from the No Action alternative. There would not be any effects in the short-term. This alternative would not provide a diversity of habitat conditions for these species' prey. In the long-term, this alternative would provide further increase in the density of understory. A high density of understory trees, in the sapling and pole stage, would impede these species' ability to forage for ground-dwelling prey. A potential large scale fire in the future would be detrimental to these two species by substantially decreasing acreage of mature and old growth forest habitat. This alternative would not provide a stable continuum of forest habitat conditions.

This alternative would not be beneficial or adverse to the **Colorado River cutthroat trout** in the short-term. In the long-term, a potential large scale fire would likely be detrimental, with resulting high concentrations of sediment to streams within the cumulative effects area where this species is present.

This alternative would not have any short-term impacts to sensitive plant species which might be present, as the **Dana Milkvetch**. A large scale wildfire in the future could be beneficial to this species by providing open habitat environment, reduction of competing species, and nutrient recycling.

General Diversity Pattern

The No Action alternative would not provide additional diversity in habitat conditions within the cumulative effects area and would not promote diversity in wildlife and plant species.

Non-Native Wildlife and Plant Species

This alternative would not promote non-native species in the cumulative effects area.

Wildlife Corridors

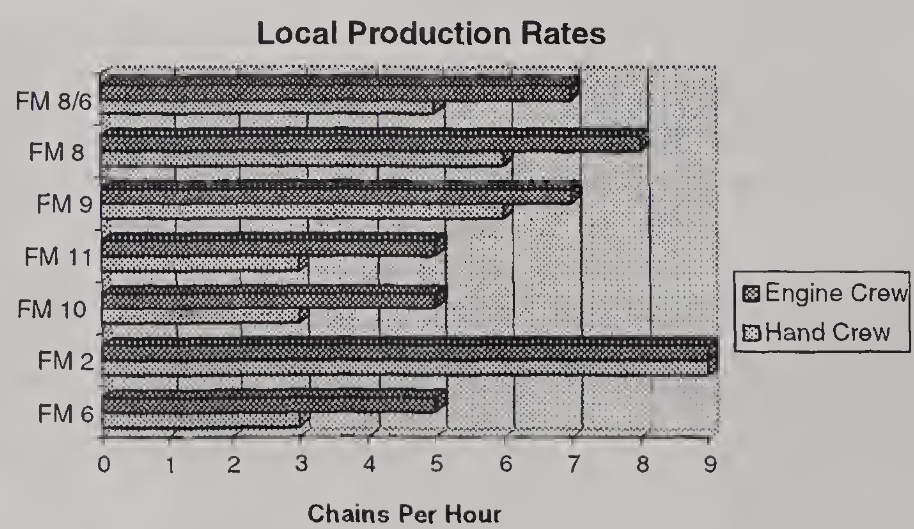
This alternative would maintain the current availability and use of wildlife corridors, for seasonal migration and for landscape dispersal for species associated with mature and older age-class habitat conditions. This alternative would not contribute to landscape dispersal for species associated with younger age-class habitat conditions, until such time that a large scale wildfire occurs

4.1.9 EFFECT OF NO ACTION ON FIRE

4.1.9.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON FIRE

Affects will be looked at in terms of vegetation changes, associated fire behavior and probability of large fire occurrence. The document entitled "A Fire Management Strategy for the East Side Fire Management Zone" looked at this concept and is the basis for the following predictions, a copy of this document can be found in the project folder, with further information be found in the ESFMZ project folder.

The fire behavior characteristics by individual fuel models were entered into the BEHAVE Fire Behavior Predictions and Fuel Modeling System, Burn Subsystem FIRE1, CONTAIN program to determine if fires could be caught within the initial burn period by local resources. Prior to interpolating the results of the CONTAIN runs fire line production rates (fireline construction in chains per hour) needed to be determined. National standard production rates were used, and modified as necessary to reflect the local fire resource capabilities which consists of a type 6 engine (200 gallon tank, with 50 GPM pumping capacity) or a 3 person hand crew. Fire Behavior characteristics such as ROS, FL and FLI for the appropriate FM are listed in Section 3.9.2. Fire behavior and associated costs will not be looked at in every FG. The following graph identifies local production rates.



Fire Group 0

With No Action taking place within the **sagebrush** treatment area, the objectives listed under the Purpose and Need would not be met. An even age class would be present, pinyon/juniper would continue to encroach the area and eventually take over. With pinyon/juniper dominating these areas, necessary ground fuels to carry a ground fire would be greatly reduced. The potential for natural fire spread would therefore be reduced under normal weather conditions. Even with the reduction of ground fuels necessary to sustain a continuous ground fire, under the proper conditions (fuels and weather) these stands would be prone to a crown fire. Historically fires burned with fire behavior characteristics of a FM 2. As they approach mid to late succession fire behavior characteristics would be represented by a FM 6. Both fuel models have similar fire behavior characteristics however due to the size of the fuels which would be consumed, FM 6 would be of longer burn duration. This longer burn duration causes additional affects on soil heating; it also reduces the effectiveness of fire suppression personnel. Utilizing the CONTAIN runs local resources are unable to catch a fire burning in either FM, this is based on uniform weather, topography and fuels. The local resources can produce a greater amount of fireline per hour in FM 2. Therefore, fires occurring in FM6 would take longer to suppress increasing the cost of suppression.

Within the rocky sparsely vegetated slopes fires will be limited to single tree events due to the lack of ground fuels necessary to carry fire. These sites are within PFC and fire intensities would be low.

Fire Group 1

With No Action taking place within the **pinyon** and **juniper** treatment area, the objectives listed under the Purpose and Need would not be met. Size class diversity would not change, nor would forage levels be increased. No Action would have a limited effect on the accumulation of fuels. Fuel loadings would remain low. Chances for a ground fire would remain low, due to lack of fuels. These low intensity fires would remain small in size. Canopy cover and basal area would slowly increase, reducing understory vegetation. As basal areas increase, the risk of a stand replacing fire also increases. Under extreme fire conditions this area could experience a high severity stand replacement, crown fire. Fires of this nature are extremely difficult to suppress and very costly.

Currently a combination of FM 8 and 6 best represents overall conditions. Based on uniform weather, topography and fuels the local hand crew would be unable to stop the spread of a fire burning under any weather condition. Under certain weather conditions the local engine would be able to stop fire spread. As succession continues and a FM 8 becomes predominant either of the resources would be able to stop the fire spread if it was on the ground and not in the canopy. With no action taking place fire would not be allowed to mimic its natural role within the pinyon/juniper ecosystem.

Fire Group 2

With No Action taking place within the **oak** treatment area, the objectives listed under the Purpose and Need would not be met, which is to create a healthier vegetation condition moving the area to the desired condition/properly functioning condition, and the reintroduction of fire into the ecosystem. Without fire, stand densities would continue to increase. Fuel loads would remain high, current fuel loads range between 10-16 tons per acre, desired fuel loads should range between 5-7 tons per acre as specified with the "Management Recommendations for the Northern Goshawk in the Southwestern United States" (Reynolds, et. al., 1992). As fuel loads increase the intensity and duration of heat produced during a fire also increases. In the event of an unwanted wildfire, intensities

would be higher than what historically would have occurred. Current fuels characteristics of these stands make them more susceptible to a stand replacement fire. Fire intensity would be great enough to pose a control problem and suppression would be costly in this situation.

Based on uniform weather, topography and fuels, local resources would be unsuccessful in stopping the spread of a fire burning under any weather condition. Fuels would continue to increase, as would the intensity of which future fires would burn. Ponderosa pine stand above and adjacent to these sites would be at a higher risk of fire spreading into them. The cost of suppression would continue to increase as these fires would take a greater effort to suppress requiring additional resources.

Fire Group 3

With No Action taking place within **ponderosa pine**, the objectives listed under the Purpose and Need would not be met. Stands would continue to be vulnerable to large scale, high intensity stand replacement fires. Without burning, fuels loads would continue to increase. It is estimated that needle cast alone can contribute 1.75 tons per acre yearly (Bradley, et. al., 1992), this would be added to the estimated 8 to 16 tons per acre already existing on site. The desired fuel loads should range between 5-7 tons per acre as specified with the "Management Recommendations for the Northern Goshawk in the Southwestern United States" (Reynolds, et. al., 1992). Thick layers of duff trap nutrients, these nutrients would remain trapped without burning. Burning would release substantial amounts of nutrients that are bound up in surface organic matter. These nutrients would then be available for plant consumption. Without the use of prescribed fire to control fuel loadings, the potential for fire would continue to increase and with that so does the potential for a stand replacing crown fire. The majority of wildfires which occur on the Escalante Ranger District, occur within the ponderosa pine type.

The Document entitled " A Fire Management Strategy for the East Side Fire Management Zone" looked at the probability of fires which would within the ESFMZ excluding the Box-Death Hollow Wilderness, and for statistical purposes one large fire was also removed from the analysis. This analysis determined that there would be approximately 212 fires over the next forty years, burning nearly 900 acres. This is based on current forest direction with the existing workforce in place. Suppressing these fires would cost approximately 4.4 million dollars (compounded to 40 years). If fires had played a role in maintaining these stands the number of fire starts would not change, but the acres burned at the forty year period would be reduced in nearly half. Costs associated with suppression would also be reduced by 1.7 million dollars (compounded) (ESFMZ, P.Goetzinger 4/98).

By including fires which occurred within the wilderness and other large fires the probability of large fires increases over the forty year period. It would now be probable of having 243 fires, burning 3,125 acres, at a cost of approximately 9.5 million dollars (compounded). There is a 98 percent probability of having one fire reach 1,000 acres in size, and a 25 percent probability of one fire reaching 5,000 acres in size (PROBACRE).

Most sites are currently classified as FM 11, based on uniform weather, topography and fuels the local hand crew would be unsuccessful in stopping the spread of a fire burning under any weather condition. The local engine would be able to catch most fires, if the fire was less than 1/2 acre when it arrived. The engine would only be successful in catching fires if vehicle access existed. The engine crew would be unable to catch any fire under the 90th and 97th percentile weather. With no action taking place these stands would not be returned to their historical fuel model (FM 9 or FM 2).

The desired condition would be a FM 9. Local resources have a higher success rate of catching fires which occur within FM 9.

With No Action taking place, stand densities and fuel loads would continue to increase. These stand would be susceptible to insect and disease activity. As fuel loads increase so does the intensity of which fires would burn. This coupled with increasing stand densities would increase the risk to large scale high intensity stand replacement fires (see fire behavior characteristics comparison in FG 3, section 3.9.2.4).

Fire Group 5

With No Action taking place within **mixed conifer**, the objectives listed under the Purpose and Need would not be met. Without disturbance fuel loads, stand densities, and insect and disease problems would continue to increase. Current fuel load levels exceed the desired level, which should range between 10-15 tons per acre as specified with the "Management Recommendations for the Northern Goshawk in the Southwestern United States" (Reynolds, et. al., 1992). As the vegetation structure declines, fuel configurations continue to increase the potential for stand replacement fire. Historically a FM 8 would have been present. Fire behavior characteristics for FM 8 are of low intensity with local resources have a high success rate of catching fires. Fire behavior characteristics of a FM 10 are of high intensity with local resources having limited success in fire suppression (see fire behavior characteristics comparison in FG 5, section 3.9.2.5). Current fuel configurations are prone to high intensity stand replacement fires. Fires of this nature are difficult to control and costly to suppress.

Fire Group 7

With No Action taking place within **aspen**, the objectives listed under the Purpose and Need would not be met. Without disturbance FG 7 (FM 8) would be converted to FG 10 (FM 10). Fire group 7 can be characterized as being lush and green with an aspen overstory. During the normal fire season this FG is generally too green to burn, and acts as a fire break. Currently the aspen is not regenerating. Conifer regeneration has become established. Through time, the stand would be converted to a Fire Group 10. The heaviest down woody fuel loads in Utah forests can be expected in FG 10 (Bradley et. al., 1992). Fires which occur in FG 10 are extremely difficult and costly to suppress. Local suppression resources have a higher fire suppression success rate in FM 8 as compared to FM 10 because of the lower fire line intensities and higher production rates (see fire behavior characteristics comparison in FG 7, section 3.9.2.6). Although fuel loads are not currently very high, as the aspen begin to die out and fall over, fuel loads would increase. Young conifers with low hanging branches (ladder fuels) are susceptible to fire and act as ladder fuels to carry fire into the crowns. In the event of a stand replacing fire, the stand would then be converted back to the original FG.

Fire Group 10

No treatment is to take place within this fire group, however the effect of no action would have an effect. Without treatment in all the other proposed actions areas, this fire group would be at risk to a high intensity stand replacing fire situation, due to fire spreading from adjacent Fire Groups.

Forest Plan Consistency

Under the No Action Alternative, there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. However, Desired Conditions and Need for Change listed within the LRMP, for both fuels management and prescribed fire would not be

met. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would be lost.

4.1.9.2 CUMULATIVE EFFECTS OF NO ACTION ON FIRE

All Fire Groups

Within the Cumulative effects area (ESFMZ) past activities along with fire suppression policies has led to conditions prone to large scale wildfires of catastrophic proportions (Federal Wildland Fire Management Policy & Program Review, 1995). Large wildfires are very difficult, dangerous, and costly to suppress. The risk of wildfire is particularly important in terms of fires which may occur on the National Forest lands and have the potential to burn onto private lands. Increased risk of wildfire would increase the potential loss of life and personal property on private lands, residences, and inholdings such as Garkane Power Plant. Fires of this scale and intensity would be outside the historical intensity levels. In general the potential number of fire starts would remain constant. The severity of which these fires burn would continue to increase over time. Currently there is much National emphasis being placed on allowing naturally ignited fire to burn mimicking the natural fire disturbance regime. Both the Escalante and Teasdale Ranger Districts will be starting work on a joint Fire Management Plan. This plan would allow certain naturally ignited fires to burn under specified conditions, intensities and locations. With no action taking place pretreatment of necessary fuels build up would not occur. This would limit the number of naturally ignited fires which would be allowed to burn, due the severity at which they would burn.

4.1.10 HERITAGE RESOURCES

Under the no action alternative, there will be no effects to historic properties.

4.1.11 EFFECTS OF NO ACTION ON SOCIO/ECONOMICS

Given the considerable extent of non-commercial treatments proposed to meet the Purpose and Need, and the minor amount of forest products proposed through commercial sale, the effects of the alternatives in this section are measured by; the amount of forest products available, qualitative judgements on the impacts to recreational use, particularly hunting, and total costs of the proposed treatments.

"Non-market" resources include wildlife, soil, water, or visual quality, for which actual financial value cannot be assessed because markets are not available to establish values. These were evaluated by other techniques which measure environmental gains or losses to the specific resource, rather than in economic or financial units of measure. The economic analysis did not assess non-market resources. It did incorporate known costs of activities which will produce a benefit to certain resources or their habitat, such as prescribed burning treatments to improve wildlife habitat. The resulting benefit was not priced to establish a monetary value. It was , however, incorporated in the comparison of alternatives by the evaluation of effects of the alternative on wildlife.

4.1.11.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON SOCIO/ECONOMICS

Implementation of the No Action alternative does not provide additional public benefits to local jobs or income generated from the forest products industry. This would not have any observable effect on non-timber jobs in recreation or tourism industries. Present trends would be expected to continue, particularly in terms of sight-seeing, fishing, and hunting.

Economics

Even though this alternative does not result in implementation of an action alternative, there are certain planning costs which would still be incurred. These costs are estimated at 80% of NFMA/NEPA costs, which equal $44,904.00.

4.1.11.2 CUMULATIVE EFFECTS OF NO ACTION ON SOCIO/ECONOMICS

No Action does not provide additional public benefits to local jobs or income generated from the forest products industry, and does not make fuelwood available beyond current levels. Given the small potential of this project area to yield substantial forest products, under this analysis, there would, most likely not be an adverse cumulative effect of the No Action alternative in limiting the wood supply to the Garfield County economy.

4.1.11.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

An irretrievable long-term (greater than ten years) adverse effect of No Action could be the loss of economic benefits from wood fiber growth that would occur as compared to action alternatives where regeneration practices are proposed. Stand/tree growth would not be increased and mortality would not be reduced as proposed by the action alternatives.

4.1.12 EFFECTS OF NO ACTION ON AIR QUALITY

4.1.12.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON AIR QUALITY

Under this alternative, no treatment activities would occur, and there would be no effect on air quality.

Forest Plan Consistency

Under the No Action Alternative, there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would be lost.

4.1.12.3 CUMULATIVE EFFECTS OF NO ACTION ON AIR QUALITY

In the event of a catastrophic stand replacement fire, large amounts of smoke would be released into the atmosphere. In the event that the entire project area would burn due to a large unwanted wildland fire, it is estimated that 4,556 tons of particulate matter would be produced. Visibility would be reduced, gaseous pollutants, and airborne particulates would be released into the atmosphere. These effects would be short term and only noticeable while the unwanted wildfire was burning.

4.1.13 EFFECTS OF NO ACTION ON LIVESTOCK GRAZING

4.1.13.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON LIVESTOCK GRAZING

Under No Action, there would be no direct or indirect effects on Livestock Grazing.

4.1.13.2 CUMULATIVE EFFECTS OF NO ACTION ON LIVESTOCK GRAZING

With the No Action Alternative, the only cumulative effects on Livestock Grazing would be those described in Alternative C of the Sand Creek Soil Stabilization Project EA, pages 4-101 and 4-102 and not associated with this project proposal.

4.1.13.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Under No Action, there would be no adverse effects on nor any irreversible/ irretrievable commitments of the Livestock Grazing resource.

4.1.14 EFFECTS OF NO ACTION ON SPECIAL USES AND ON MINERALS

4.1.14.1 DIRECT AND INDIRECT EFFECTS OF NO ACTION ON SPECIAL USES AND ON MINERALS

This alternative would have no effects on current permitted uses or mineral leases.

4.1.14.2 CUMULATIVE EFFECTS OF NO ACTION ON SPECIAL USES AND ON MINERALS

This alternative would not promote or preclude the current or potential future uses and mineral developments within this area of influence. This alternative would not address the potential for a future large-scale wildlfire. Such potential fire could result in adverse effects to the current uses in the form of indirectly causing excessive sedimentation in the irrigation ditch and discourage the services of the outfitter-guide permittees within a large burn area.

4.1.15 EFFECTS OF NO ACTION ON TRAVEL MANAGEMENT

DIRECT AND INDIRECT EFFECTS OF NO ACTION ON TRAVEL MANAGEMENT

The effects of taking No Action on travel management is the amount of road reconstruction, the amount of roads being closed to vehicular use and the amount of roads and/or trails on which the type of use is being altered. Because the travel management activities directly and indirectly effect the other resources within the analysis area, these effects are disclosed in the proceeding resource sections.

With No Action the travel management as described in the Affected Environment would continue. Natural closure of roads as a result of wind throw and erosion could be expected to occur. Progressive deterioration of the poorly located and designed roads could be expected to continue with accelerated erosion occurring as time passes and runoff channels develop.

Under No Action, there would be no conflict with the Land and Resource Management Plan for the Dixie National Forest (LRMP). However, the opportunity to move the analysis area towards the Desired Future Condition as described in Chapter 1 would be lost

Road Density

The open road density within the analysis area would be the same as that described for the Affected Environment.

CUMULATIVE EFFECTS OF NO ACTION ON TRAVEL MANAGEMENT

Travel management activities directly and indirectly effect the other resources within the analysis area.

Effects of sedimentation due to road reconstruction, road closures, or changes in use are discussed in the recreation, wildlife, soils and hydrology sections of this document.

OTHER EFFECTS ANALYSIS REQUIRED BY CEQ

There are no management activities proposed under No Action.

4.2 EFFECTS OF PROPOSED ACTION

4.2.1 EFFECTS OF PROPOSED ACTION ON VEGETATION

4.2.1.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON VEGETATION

Forest Ecosystems

Ecosystems

Approximately 200-250 acres of existing **sagebrush** stands would be treated with stand replacement prescribed fire followed with seeding where current seed source is inadequate. This action would create patches of grass/forbs with little if any sagebrush and conifer trees. It is expected that within 2-3 years sagebrush regeneration would initiate. Overall, this action would create a better balance of age classes more representative of historic fire frequencies and patterns (Draft Properly Functioning Condition - Process-- 12/23/96, pages 28, 14-15, 17-19, Draft PFC for Major Vegetation Types, pages 4, 16-17, 19-22).

Within the **PJ** zone, 3000-3500 acres would be treated with a combination of cutting and prescribed fire to create more open or savannah like stand conditions with grass/forbs/shrubs established in the interspaces. This treatment would occur in areas conducive to fire, such as high density stands adjacent to sagebrush flats, as opposed to open stands on rocky hillsides. This action would result in greater representation of a seral stage of stand development characteristic of the natural or historic periodic fire regime. In some cases the stands would revert back to early grasses. Studies indicate (Gottfried, 1996) in Utah, juniper will be the first tree species to invade with tree dominance occurring in 70 to 80 years. In other cases fire will create open savannah like stands with greater concentrations of ground vegetation in openings. Areas treated with fire which are lacking in grass/forbs seed sources or are subject to erosion will be seeded. Restoration of PJ sites to restore ground vegetation require a combination of tree thinning and application of grass seed (Chong, 1994). Elimination of just livestock grazing will not restore areas (Chong, 1994, Bunting, 1986). Approximately 780 acres of this treatment would entail felling conifer trees which are overtopping brush, such as oak. The overall effect of this treatment will be greater diversity of stand densities, age classes, and increased understory vegetation. Conditions will also more closely mimic those within the historic ranges (Draft Properly Functioning Condition - Process-- 12/23/96, pages 23, 10-11, 13-14, Draft PFC for Major Vegetation Types, pages 4, 12-13, 19-22).

Burning of 450-500 acres of **oak** brush, would rejuvenate the oak clones into a younger, seral stage of new oak sprouts (Clary and Tiedemann, 1993). Conifer trees found within the oak clones would generally be killed from burning, thus creating snags. This action would increase the diversity of stages of oak stand development, more characteristic of conditions with historical fire disturbances (Draft Properly Functioning Condition - Process-- 12/23/96, pages 25, 12-13, 15-16, Draft PFC for Major Vegetation Types, pages 4 and 15, 19-22).

A cool surface fire treatment would be prescribed on approximately 7000 acres of **ponderosa pine** stands. This action is designed to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir (Covington and Moore, 1995). Mortality to some live ponderosa pine trees would increase snag densities and provide areas suitable for pine regeneration. Generally this action will move stand conditions more closely associated with the historic frequent fire regime (Sackettt, 1990) and reduce the risk to catastrophic fire (Draft Properly Functioning Condition - Process-- 12/23/96, pages 22, 9-10, 12-13, Draft PFC for Major Vegetation Types, pages 4, 10-12, 19-22).

Aspen would experience three different treatments; 1000 acres of removal of understory conifer trees, 302 acres of aspen regeneration using harvest methods, and 700 of aspen regeneration using stand replacement fire. The removal of understory conifer trees is designed to provide more areas in which aspen will dominate now and in the near future (Harniss, 1982, Alder, 1970). Delay of the conifer succession provides a greater diversity of aspen stand conditions, reducing the dominance of seral aspen stands succeeding to conifer. Both regeneration treatments would be designed to kill the existing conifer and aspen trees, thereby stimulating the aspen sprouting (Schier, 1975, Debyle and Winokur, pg 197-198, Brown, 1985) and eliminating conifers. Aspen sprouting would occur within 1-3 years. Initial suckering rates can be as high as 10,000-30,000 tree per acre with 65% mortality within ten years (Hittenrauch, 1984). The intensity of the treatments in terms of tree removal/mortality was based on suckering rates increasing with degree of tree removal, clearcutting being optimum (Hittenrauch, 1984, Frykman, Jacobi, 1990). The 1002 acres of aspen regeneration will create a better balance of age and structural class diversity of aspen and reduce the successional preponderance to conifers across the project area. The long term effect of these treatments would be to establish young, healthy, seral aspen clones. These stands would have minimal conifer composition and serve in the future as replacement old growth/dominant aspen stands. Use of fire on 700 acres will mimic the historic disturbance effect of fire behavior. Overall these treatments will create conditions closer to those found within the historical range, patterns, and structural stages (Draft Properly Functioning Condition - Process-- 12/23/96, pages 17, 3-4, 9-10, Draft PFC for Major Vegetation Types, pages 4, 7-9, 19-22).

The **mixed conifer** zone would have 300-350 acres of cool surface fire prescribed. The intent of this treatment is similar to that proposed in the ponderosa pine in which fire would be used to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir. Mortality to some live ponderosa pine/Douglas-fir trees would increase snag densities and provide areas suitable for pine/Douglas-fir regeneration. Generally this action will move stand conditions more closely associated with the historically frequent fire regime and reduce the risk to catastrophic fire (Draft Properly Functioning Condition - Process-- 12/23/96, pages 19-205-7, 10-12, Draft PFC for Major Vegetation Types, pages 4, 9-10, 19-22).

Ecosystem Health

The use of harvest and burning methods in the sagebrush PJ, oak, ponderosa pine, aspen and mixed conifer would mimic disturbances associated with the historic fire regime. Sagebrush ecosystems

would be restored to a greater balance of age classes, canopy density, and range increased to more historical levels. The effect would be creation of stand fuel conditions within the ponderosa pine and mixed conifers more closely associated with a frequent fire regime while increasing snag distribution in the previously harvested stands. Decadent aspen stands would be rejuvenated. Seral, conifer free stands of oak would be created. This would have the net effect of increasing the health of the ecosystem for both the short and long term by the overall acres treated, 12,952-13,602.

Stand Health

The effect of stand replacement fire in 200-250 acres of sagebrush will be to create a more diverse ecosystem of age structure diversity which improves the overall health of the sagebrush stands.

Within the treated 3000-3500 acres of PJ, stand health would be improved in the short term by substantially decreasing stand densities. Over the long term, creation of a younger stand of PJ and a more heterogenous landscape would reduce the potential for insect activity versus a mature stand. In addition, creation of a mosaic of stand conditions, reduces the potential for a landscape level disturbance and will create stand conditions conducive to more frequent fire.

Treatment in the oak would rejuvenate the existing oak, eliminating conifer encroachment, and creating a younger and healthier stand of oak. Over the long term, these stands would provide longer term stability than the untreated clones.

7000 acres of prescribed fire within the ponderosa pine and 300-350 acres within the mixed conifer would have the benefit of releasing nutrients currently held in the leaf litter to surrounding trees. Reducing both the ground and ladder fuels would provide greater security against stand replacement fire throughout the conifer belt. Some tree mortality, generally less than 5% based on district experience within Stump Springs, would be expected to accomplish the burning.

The aspen treatments would rejuvenate the diseased, mature stands of aspen, thus creating younger, disease free clones. These clones would be more capable of surviving over the long term.

These treatments would have the net effect of increasing the health of the stands for both the short and long term by the overall acres treated, 12,952-13,602.

Productivity

The short term effect of surface fire within the ponderosa pine and mixed conifer will be the availability of nutrients released by the burning versus the potential widescale loss of trees caused by extreme fire behavior (Covington and Moore, 1994). Expected tree mortality from fire will create understocked openings and loss of stand productivity. The long term effect will be a more resilient conifer ecosystem to catastrophic losses from stand replacement fire.

Within the aspen zone, regeneration treatments would reduce current site utilization. Based on observations of similar treatments in the Barker area, It is estimated that it will require approximately 15 - 20 years for these stands to return to existing site utilization levels. Once this occurs, productivity would increase as a young healthy, fully stocked stand of aspen grows towards maturity.

Overall, there will be some losses to stand productivity over the short term by the 7,602-7,652 acres of treatment. However, long term stand productivity would be improved by those same treated acres with the reduction of risk to stand level mortality and understocking.

Vegetative Structural Stage Distribution

Within the Side Hollow Nest Area, there would be 18 acres of aspen maintenance in which understory conifers would be removed non-commercially, and 93 acres of underburning in the ponderosa pine. Both of these treatments are acceptable methods for managing nest area vegetation and will move the area towards a more desirable condition (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 21-22) by removing undesirable understory trees with non-uniform spacing using hand tools. Also within the PFA, 223 acres of ponderosa pine underburning are proposed. This action also utilizes acceptable methods and effects by increasing snags, reducing hazardous fuels and recycling nutrients, and encourage aspen and oak regeneration (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 22-26).

For the Sand Creek home range, the nest area would have 30 acres of aspen maintenance and 134 acres of ponderosa pine treatment. Within the PFA, there would be 557 acres of ponderosa pine underburning. Effects would be similar to those described under the Side Hollow home range.

No Treatments are planned in the McGath Lake home range nest or PFA.

Within the foraging areas the following would occur; 952 acres of aspen maintenance, 302 acres of aspen regeneration harvest, 700 acres of aspen regeneration burning, 5,993 acres of ponderosa pine underburning, and 300-350 acres of mixed conifer underburning. Although specific aspen management for the northern goshawk have not been developed, applying the general habitat principles would provide suitable habitat management. For aspen, management would create a variety of VSS classes through the regeneration methods, increase the diversity of the landscape by maintaining early seral aspen, provide more stable aspen through understory removals, increase snags via burning, and recycle nutrients (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 26-30).

The "Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah (1998) provides for use of local assessments in designing treatments in aspen habitat. The planned aspen regeneration patterns fall within the historic range of variation to mimic natural disturbance patterns.

Initially, aspen regeneration areas may be too large an opening for suitable goshawk habitat, but once stocking is fulfilled and suitable for goshawk use (approximately 15 years), the treated areas will return to suitable habitat. The snag retention and use of irregular shaped, feathered edges, and group retention of live trees may provide sufficient cover to maintain usable habitat in the harvest areas. Mosaic burn patterns may also retain sufficient cover to maintain habitat. These treatments would provide long term sustainability of aspen, considered desirable for certain goshawk prey.

Forest Land Suitability

Under this alternative, only lands suitable for timber production would be harvested. Mitigation measures would provide protection of these sites as well as other proposed treatments for long term productivity.

Old Growth

Treatments in the pinyon/juniper and aspen would have an effect on existing and future old growth. The initial effect on the PJ stands, would be loss of up to 904 acres of existing old growth, reducing existing habitat to 5,418 acres or 36 percent of the PJ vegetation. However, the prescribed burning may retain sufficient large old trees or due to the mosaic burn patterns leave sufficient areas unburned that less old growth habitat would be lost. The benefit of this treatment approach is to create a more heterogenous landscape which is less susceptible to catastrophic stand replacement fire, including the loss of existing old growth. In the long term (250-300 yrs), these stands may serve as replacement old growth stands and ensure a more continued presence of old growth habitat over time.

Approximately 512 acres of existing ponderosa pine old growth would be treated with low intensity surface fire to reduce ground and ladder fuels, as well as replicating the natural role of fire. This treatment has been recommended (Covington and Sackett, 1986, 1990, Covington and Moore 1994 and 1994, Kolb et al, 1994) to enhance stand conditions favorable to old growth.

There will not be mixed conifer old growth proposed for underburning. These stands are in remote locations and in need of mechanical treatment to reduce stocking levels prior to prescribed fire initiation. These stands would benefit from reduction in risk to catastrophic fire throughout the project area, thereby increasing the ability to suppress fires into the old growth.

Some mortality may occur but would not be at levels which would eliminate a stand from qualifying as old growth. Past experience with underburning in ponderosa pine in areas such as Stump Springs demonstrates less than 5% tree mortality favoring trees in the low to middle size classes. Creation of snags would improve the quality of the old growth.

Scheduled aspen regeneration treatments would reduce existing old growth by 467 acres to 942, or 28% of the aspen within the project area. The long term effect would be that these regenerated stands could provide future old growth in 100 years, thereby providing future stability of the aspen type.

In the short term, existing old growth habitat could be reduced by up to 1,371 acres, reducing the total to 7,007 acres. Old Growth would be reduced to 21% of the project area, or 25% of the forested acres. The long term effect would result in greater stability of old growth through reduced risk to catastrophic losses, and the increased ability to sustain old growth over time.

Forest Plan Consistency

Under this alternative, all proposed treatments are consistent with the Land and Resource Management Plan for the Dixie National Forest. These treatments are designed to move the analysis area towards the Desired Future Condition as described in Chapter 1.

4.2.1.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON VEGETATION

Forest Ecosystems

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek subwatersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs).

The greatest potential change in effects would be if a large stand destroying event such as fire spread

throughout the area. Implementation of the Proposed Action would reduce the risk of catastrophic fire to the sub-watersheds by reducing accumulated ground and ladder fuels and develop greater stand structure and composition diversity. These changes are especially important to the cumulative effects areas since this area is also very similar to the project area, being very homogenous and susceptible to more intense fire than the normal historic range. These treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,952-13,602.

Ecosystem Health

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs).

Implementation of the Proposed Action would improve the ecosystem health at this scale given the extent of proposed treatments which will reduce stand densities, decrease shade tolerant species, reduce forest floor fuel accumulations, and maintain certain key ecosystems (oak, seral species dominated by mixed conifer, and aspen) . These changes would result in increasing the diversity of the sub-watersheds and decrease the destructive potential of wildfire eliminating the forest cover at the landscape level. Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,952-13,602.

Stand Health

The area of analysis for the cumulative effects would be the Sand Creek and Bear Creek sub-watershed. As the potential for insect/disease activity increases, the risk to adjacent stands increases. Stands with highest density levels and/or age classes could provide a source for infection or infestation into surrounding areas. An example would be dwarf mistletoe infection centers could provide sufficient beetle susceptible trees to build-up populations which then fly into adjacent stands. An additional threat is these mortality centers providing snags/fuel for wildfire which carries into surrounding stands (Knight, 1987). Implementation of the proposed treatments would create greater diversity of stand densities, structure and composition closer to the historic ranges. Greater stability within these ecosystems would decrease levels of insects and diseases at both the project and sub-watershed scales. Therefore these treatments would have the net effect of improving the cumulative effects area by the overall acres treated, 12,952-13,602.

Productivity

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs)

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area resulting in widespread mortality and hence under utilize site productivity. Implementation of the proposed treatments would reduce the risk of such mortality both within the project and sub-watershed scales. Productivity would be shifted to seral species, which are more capable of attaining the larger sizes (ponderosa pine and Douglas-fir). Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,952-13,602.

Vegetative Structural Stage Distribution

The area of influence for the cumulative effects analysis is the project area divided into the various goshawk management areas for the three nest areas located within the project area (project file, vegetation). Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands as well as regeneration of aspen, with the intent to develop stands towards northern goshawk habitat (LBS Vegetation Treatment Project, Chapter 4, pages 31-32) . These activities were designed to improve existing conditions towards the desired future condition for northern goshawk, by emphasizing a younger age class of seral pioneer species. Implementation of these activities as well as those proposed under this project will lead to further enhancement of vegetation conditions for future goshawk habitat.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area. Implementation of the proposed treatments would reverse this trend by lowering stand densities, reducing shade tolerant species, introducing fire as a disturbance, and enhancing stand structure and composition diversity. Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,952-13,602.

Forest Land Suitability

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests, having been planned prior to the LRMP, did not classify lands for timber suitability. These timber sales incorporated forestry practices which maintained soil productivity. Existing and future treatments would comply with suitability requirements. Therefore there would not be any change on land suitability.

Old Growth

The following table summarizes the cumulative effects by drainage, considering the implementation of the Proposed Action as well as LBS Vegetation.

Table 4.2.1 Old Growth by Drainage

Drainage	Total acres	Existing O. Growth ac.	% Existing Old Growth	Predicted Old Growth ac.	Predicted% Old Growth
Big Hollow	3,872	2,258	58	1,560	40
Dry Hollow	735	19	3	19	3
Pretty Tree	1,535	425	28	425	28
Side Hollow	3,038	245	8	245	7
Lake Creek	14,845	4,243	29	3,638	22
Bear Creek	8,030	1,381	17	1,067	13
Upper Sand Creek	14,582	2,678	18	2,678	18
West Fork Boulder	14,917	1,298	9	1,274	8
Middle Boulder Creek	3,393	362	11	362	11
Total	64,947	12,909	20	11,468	18

Implementation of the LBS Vegetation project would reduce old growth habitat within the Lake Creek drainage by 100 acres of pinyon/juniper, resulting in 3,738 acres of old growth or 24%.

With the exception of Dry Hollow, each drainage meets or exceeds the forest plan standard for old growth. No treatment activities are planned within the Dry Hollow old growth.

Implementation of the proposed actions would not only provide for maintaining adequate existing old growth habitat, but would provide for a rotation of future old growth through creating different stages of stand development throughout the project area and hence the cumulative effects area, which is very similar to the project area. The risk to catastrophic or stand replacement fire within the cumulative effects area would be reduced. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,952-13,602.

4.2.1.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be a loss in vegetation cover associated with OHV trail designation, harvest, and prescribed fire treatments. Implementation of harvest and prescribed fire treatments would reduce existing old growth in the pinyon/juniper and aspen old growth by 1,371 acres.

Short Term vs. Long Term Productivity - The Proposed Action includes timber harvest, thinning, and prescribed fire activities which result in short term (less than 10 years) effects as described in this section. The design of these treatments includes maintenance or enhancement of long term productivity. In addition, the silvicultural prescriptions and effects will be monitored (Appendix 1) to assure that standards for long-term productivity are met.

Irreversible/Irretrievable Commitments - Ground disturbance associated with logging practices, prescribed fire, and OHV use would result in loss of existing vegetation. For skid trails and landings, vegetation is restored on the disturbed areas, but the type of vegetation may be changed from timber to grasses and legumes if these areas are to be part of the permanent transportation system. Trail construction and maintenance activities would revegetate disturbed soil areas. Revegetation of prescribed fire treatments are designed to utilize as much natural regeneration as possible, with unacceptable areas planned for seeding. Succession of vegetation types (sagebrush to pinyon/juniper), tree species (aspen to conifer), reduction of tree or stand growth, ecosystem diversity, old growth aspen would be reduced by the total acres treated, 12,952-13,602 as compared to the No Action, but not eliminated.

These losses would be irretrievable but not irreversible.

4.2.2 EFFECTS OF PROPOSED ACTION ON RECREATION

The Proposed Action is consistent with the direction provided in the Land and Resource Management Plan for the Dixie National Forest. Implementation of the Proposed Action would move the analysis area towards the Desired Future Condition as described in Chapter I of this document.

4.2.2.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON RECREATION

Sight Seeing/Driving for Pleasure - Implementation of the Proposed Action would have little effect on sight seeing or driving for pleasure along the Hells Backbone Road (153). Adjacent to the Hells Backbone Road vegetation treatments would consist of using prescribed fire in the oak and sage brush vegetation types. The short term effect would be an area where the effects of fire, such as burnt vegetation and charred stumps, are visible. In the long term, the visual variety would be enhanced as a result of the creation of new age and size classes. Consequently, the recreational experience of the forest user would be enhanced.

Dispersed Camping - Due to the size of the analysis area, the overall effect of implementing the Proposed Action on the level of dispersed camping would be minimal. The most impact would occur along Forest Road 494 to McGath Lake and Forest Road 566 to the Dry Lake Trailhead. These sites are close to the road and adjacent to the timber edge. During management activities camping activities would move to other sites but would return to normal patterns once the management activity is completed. Since the majority of the dispersed camping is associated with hunting, the amount of use would depend on how hunting is effected by the Proposed Action.

Hunting - The effects of implementing the Proposed Action on hunting would be minimal due to the limited number of acres treatment acres within the analysis area. Hunting would continue at present levels, although concentrations of animals would shift as harvest operations and changes to vegetation occur.

Fishing - Implementation of the Proposed Action would have no effect on the fishing use occurring within the analysis area. There are no ground disturbing management activities proposed adjacent to fishing areas. Access to known fishing areas is not expected to change.

Hiking - Those forest users who hike the trails within the analysis area who be the most effected by implementing the Proposed Action. Since hikers are travelling at a much slower speed, the visual effects of their recreation experience would be most effected by the proposed treatments. The mitigation measures identified in Chapter 2 were developed to keep and/or bring these effects within tolerable limits.

Off Highway Vehicle (OHV) Use - Implementation of the Proposed Action would reduce the miles of road and trails open to OHV use to 52.9. Overall OHV use in the area would decrease due to the reduction in the amount of roads remaining open to motorized use. The amount of use on designated OHV trails and roads open to motorized use would decrease during treatment activities, but would return to current levels once operations are completed. Regionally, long term use by OHVs is projected to increase by 5-10 percent over the next 10 years (Bowker, English, and Cordell, 1999). Similar increases in use are expected at the forest and district levels.

Mountain Biking - Long term use of the area by all recreation users, including mountain bikers, is expected to increase. In the short term, the effects of implementing the Proposed Action have only

minimal effects on this activity. The Hells Back Bone Road would continue to be the most popular mountain bike route.

Winter Sports - Snowmobiling and other winter recreation activities would not be effected by the Proposed Action and would continue to grow at present rates.

Other - Implementation of the Proposed Action would have minimal if any effect on personal use Christmas tree cutting. There would be a short term increase in the amount of fuelwood gathering following the harvest activities.
The majority ($\geq$ 85 percent) of the recreation use occurs in the aspen, ponderosa pine, and mixed conifer vegetation types. Implementation of the Proposed Action would result in the application of seed for forage production and erosion control in the pinyon-juniper and sagebrush vegetation types. Since recreation use in the lower elevations is limited and sporadic, the use of native vs non-native seed would not have an effect on recreation use in the project area.

4.2.2.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON RECREATION

Disruptions in use within the analysis area due to actual ground disturbing activities or to perceived changes in the visual resource caused by management activities may cause the recreationist to move elsewhere in the cumulative effects area or possibly outside the area. Such disruptions in recreation use would be short lived. Long term use is expected to increase at previously projected levels.

4.2.2.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

There are no management activities proposed in or adjacent to the Box-Death Hollow Wilderness Area.

4.2.2.4 EFFECTS OF THE PROPOSED ACTION ON WILDERNESS

Direct and Indirect Effects of the Proposed Action on Wilderness

There are no management activities proposed in the wilderness area. Consequently, there are no direct effects of implementing the Proposed Action on the wilderness area.

Indirect effects of implementation such as increased noise levels due to increased traffic on Forest Road 153 may decrease solitude. These effects would be noticeable only where they are immediately adjacent to the wilderness. The features of the wilderness, including terrain and vegetation, are such that sound does not carry in the wilderness. The smoke created by the prescribed fires may effect individuals perception of the pristine quality of the wilderness. This is a short term effect. The effect of these activities within the project area would not change the ROS class of Preservation in the wilderness.

Cumulative Effects of the Proposed Action on Wilderness

The Cumulative Effects Area analysis in Chapter 3 described the past, present, and future management activities in the CEA. The combination of the effects created by these activities would not effect the wilderness character of the Box-Death Hollow Wilderness Area. Livestock grazing in the chained areas on the western edge of the wilderness area will continue. This activity would not effect the primeval nature of the wilderness area.

Other Effects Analysis Required CEQ Regulations

Implementation of the Proposed Action would not result in an irretrievable or irreversible commitment of the wilderness resource.

4.2.3 EFFECTS OF PROPOSED ACTION ON ROADLESS/UNDEVELOPED RESOURCES

INTRODUCTION

The following sections describe the effects, by alternative, on the roadless/wilderness attributes of natural integrity/apparent naturalness, opportunities for solitude and primitive recreation, special features or values, and wilderness manageability and boundaries.

INTERIM ROADS RULE

All of the action alternatives propose treatments in areas falling in Suspension Categories of the Interim Roads Rule (36 CFR 212). No roads are to be constructed or reconstructed with the Proposed Action and Alternative 2. Further, the reconstruction of certain wet sections of FR 514 under Alternatives 1 and 3 is allowed by the rule because the corridor (Road Draw) is a classified road. Therefore, all proposals are in strict conformance with the provisions of the Interim Roads Rule (Reference also Roadless Area Policy, Section 4.6.10).

IMPLEMENTING INDIVIDUAL TREATMENTS

Implementation of the individual vegetative prescriptions outlined in the Proposed Action and other action alternatives are not interdependent. Because the proposed activities are scattered across the landscape, the decision maker could select activities from the individual alternatives. The effects for each have been disclosed, and this disclosures would not change.

ANALYSIS METHODS

Direct effects were measured by determining the number of acres changed from an undeveloped to developed condition. Activities that would develop an area were determined by applying the criteria established in the Wilderness Act section 2(c) and the Draft Intermountain Planning Desk Guide for Roadless Area Inventory and Evaluation, June 30, 1998. In this guide, a roadless area is described as 1) containing at least 5,000 acres, 2) not containing improved roads maintained for travel by standard passenger-type vehicles (FSH 1909.12,7.11), and 3) not containing non-structural improvements greater than 5 acres in size such as chainings, terracing, reservoirs, and unrecovered clearcuts or where the level of development is substantially noticeable (presence of other facilities or influence of man). Disqualifying disturbances include the presence of stumps, rootwads, slash, and skid trails as well as evidence of pre-commercial thinning and the more obvious road construction. The criteria are applied to determine whether proposed activities would affect a roadless or undeveloped area to such a degree that it would no longer be suitable for wilderness designation.

Specific to the Pretty Tree Bench Vegetation Project, a key factor in analyzing the effects of specific activities on roadless/undeveloped areas is physical disturbance. Disturbance is the noticeable alteration of the area's undeveloped character due to evidence of human interference in an otherwise

natural environment. The intensity, magnitude, and duration of a given disturbance will determine if the area affected is considered developed.

In order to determine whether any of the proposed treatment would develop roadless/undeveloped lands in the Pretty Tree Bench analysis area, a *Rationale for Determining Development of Roadless/Undeveloped,* including a chart, was prepared and made part of the Project Record. Using that rational, the IDT, along with several Landscape Architects, developed a consensus to answer the development question. For the Pretty Tree Bench Vegetation Project, it was determined that "burn only" and "cut and burn" treatments would not develop any of the existing roadless/undeveloped lands. It was likewise determined that "cut only" treatments such as the proposed Aspen Maintenance and Aspen Regeneration activities would develop an existing roadless/undeveloped area for a period of time. The disclosure of effects that follow is based on those determinations. The results are summarized in the tables below which show the number of existing roadless/undeveloped acres within the Pretty Tree Bench analysis area and the acreage that would be developed with implementation of the various alternatives.

The Aspen Maintenance areas will be used as post and pole collection areas. This will result in not only chainsaw disturbance, but also collection of the material using motorized vehicles. These two disturbance features collectively result in activities, which will affect the roadless/undeveloped setting for a short period of time.

Table 4.2.3 A

Acres Developed In IRAs

	Existing Acres	No Action	P.A.	Alt 1	Alt 2	Alt 3
Boulder Mtn. IRA	243	0	0	0	0	0
McGath Lake/Auger Hole IRA	32	0	0	0	0	0
Box-Death Hollow IRA	1,098	0	0	0	0	0
New Home Bench IRA	6,000	0	0	0	0	0
Totals	7,373	0	0	0	0	0

Table 4.2.3 B

Acres Developed In Other Undeveloped/Unroaded Acres

	Existing Acres	No Action	P.A.	Alt 1	Alt 2	Alt 3
Undeveloped Area No. 1	1,764	0	732	606	0	300
Undeveloped Area No. 2	2,868	0	0	0	0	0
Undeveloped Area No. 3	3,371	0	0	0	0	0
Undeveloped Area No. 4	2,090	0	0	0	0	0
Totals	10,093	0	732	606	0	300

4.2.3.1 EFFECTS OF PROPOSED ACTION ON IRAS

DIRECT AND INDIRECT EFFECTS

Boulder Mountain/Boulder Top/Deer Lake IRA (No.07040)

Summary of Development

The Proposed Action would result in no development of the Boulder Mountain/Boulder Top/Deer Lake IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct an aspen burn in 187 acres of the total 243 acres of Boulder Mountain/Boulder Top/Deer Lake IRA falling within the Pretty Tree Bench analysis area. Even though some conifer may be cut to carry the fire, it is anticipated that most of the cut wood would be consumed and that the natural integrity and apparent naturalness of the area would be unaffected in the long term. The treated acres would still meet the definition of undeveloped lands.

Solitude and Primitive Recreation
There would be a short term effect on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. This would affect users only during the activity period. With establishment of an OHV Loop Trail, the sounds associated with a probable increase in OHV traffic would reduce the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The treatment of 187 acres would not have any effect on manageability. The roadless portion of the IRA would remain 111,182 acres.

McGath Lake/Auger Hole IRA (No.07034)

Summary of Development

The Proposed Action would result in no development of the McGath Lake/Auger Hole IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would

still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would burn 9 acres of ponderosa pine out of the total 32 acres presently roadless within the analysis area. Since the prescribed fire would replicate a natural process, there would be no effect on the natural integrity and apparent naturalness of the 117 acre portion of the McGath Lake/Auger Hole IRA that falls within the Pretty Tree Bench analysis area.

Solitude and Primitive Recreation
There would be a very short term effect on the ability of users to experience solitude during the actual burn due to the presence of workers. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the probable decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The proposed activity would have no effect on the manageability/boundaries of the McGath Lake/Auger Hole IRA. The roadless portion of the IRA would remain 8,328 acres.

Box-Death Hollow IRA (No.07033)

Summary of Development

The Proposed Action would result in no development of the Box-Death Hollow IRA and would have minimal effect on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct a burn of 114 acres of pinyon-juniper and 51 acres of sagebrush in the 1,098 roadless acres of the Box-Death Hollow IRA falling within the Pretty Tree Bench analysis area. Even though pinyon and juniper would be cut to carry the fire in both vegetation types, it is expected that most of the felled wood would be consumed. As a result, there would be no long term effects on the natural integrity and apparent naturalness of the treated 165 acres.

Solitude and Primitive Recreation
There would be short term effect on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. This would affect users only during the activity period.

With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The proposed activity would have no effect on the manageability/boundaries of the Box-Death Hollow IRA. The roadless portion of the IRA would remain 3,177 acres (including the 2,079 acre Antone Bench parcel within the Box-Death Hollow Wilderness Area).

New Home Bench IRA (No.07035)

Summary of Development

The Proposed Action would result in no development of the New Home Bench IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct a burn treatment in 29 acres of ponderosa pine, 60 acres of mixed conifer, 148 acres of oak, 2,241 acres of pinyon-juniper, and 14 acres of sagebrush. The first three burn treatments totaling 237 acres would appear as a natural process to most viewers and would leave no evidence of human activity. The last two treatments totaling 2,255 acres would require cutting of pinyon-juniper to carry the fire and it is expected that most of the felled wood would be consumed in the procedure. As a result, there would be no long term effect on the natural integrity and apparent naturalness of the total 2,492 acres in the five vegetation types. All of the acres would continue to meet the definition of undeveloped lands.

Solitude and Primitive Recreation
With the cut and burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for burn only operations. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The proposed activity would have no effect on the manageability/boundaries of the New Home

Bench IRA. The roadless portion of the IRA would remain at 6,000 acres. However, if acreages from the adjacent Undeveloped/unroaded Areas No. 3 and 4 were ever combined with the IRA, it would then have more manageable boundaries consisting of FR 153, Utah State Highway 12 and Boulder Creek. The expanded IRA would total 11,461 acres.

4.2.3.2 EFFECTS OF PROPOSED ACTION ON OTHER UNDEVELOPED/UNROADED AREAS

DIRECT AND INDIRECT EFFECTS

Undeveloped/Unroaded Area No. 1 (1,764 acres)

Summary of Development

The Proposed Action would treat a total of 1,247 acres of this Area, 732 of which would result in the development of presently undeveloped/unroaded lands. The 732 acres would no longer meet the definition of undeveloped lands and would have to be deleted from the Area. Congress would still have the opportunity to consider the 1535 acres of treated lands remaining undeveloped as well as the 259 acres (one half) of the untreated lands for inclusion into the National Wilderness Preservation System. This is because the 774 acre total aggregates with other undeveloped lands to the north and northwest to meet the 5,000 acre minimum requirement. In these acres, present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected mainly by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct burn treatments in 156 acres of ponderosa pine and in 359 acres of aspen. The ponderosa burn treatment would appear as a natural process to most viewers and would leave no evidence of human activity. While the aspen burn may require the cutting of conifers to carry the fire, it is expected that most of the felled wood would be consumed. Neither of these activities would have any long term effects on natural integrity and apparent naturalness.

The Proposed Action would conduct 607 acres of aspen maintenance treatment and 125 acres of aspen regeneration treatment within this Area. In the maintenance operation, understory conifers would be cut, leaving stumps and felled tree trunks and limbs. Without prescribed fire to consume any of the felled trees, the wood would be dependent upon wood gathering and ecological processes to decay and become more natural in appearance. The natural integrity and apparent naturalness of the area would be reduced for a number of years. The aspen regeneration treatment would remove most of the standing trees in several clearcuts up to 40 acres in size, leaving stumps on the ground and gaps in the canopy. This would reduce the natural integrity and apparent naturalness of the area for about 20 years based on similar treatments in the Barker Lakes area of the Escalante District. Photos documenting this treatment may be found in the Pretty Tree Bench Project File.

Solitude and Primitive Recreation
With the cutting and cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine burn only operation would affect the opportunities for solitude and primitive

recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for burn only operations. With establishment of an OHV Loop Trail, the sounds associated with a probable increase in OHV traffic would reduce the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
With the development of 732 acres of this undeveloped Area, the remaining 774 acres of undeveloped lands could be combined with the Boulder Mountain/Boulder Top/Deer Lake IRA and other undeveloped/unroaded lands to the northwest. If this were to happen, the manageability of the IRA would remain unaffected.

Undeveloped/Unroaded Area No. 2 (2,868 acres)

Summary of Development

The Proposed Action would result in no development of the Undeveloped/Unroaded Area No. 2 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,868 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct burn treatments in 59 acres of ponderosa pine, in 175 acres of oak, in 80 acres of pinyon-juniper, and in 93 acres of sagebrush. The ponderosa pine and oak burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon-juniper to carry the fire, it is expected that most of the felled wood would be consumed. None of these activities would have any long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine and oak burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine and oak treatment. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 2,868 acres of Undeveloped/Unroaded Area No. 2 would offer the possibility of being combined with the Box-Death Hollow Wilderness Area at some future date. If this were to happen, the wilderness area would gain a more generally identifiable boundary with FR 153 along its northeast border. However, a 152 acre island of private land would detract from the effectiveness of this proposition.

Undeveloped/Unroaded Area No. 3 (3,371 acres)

Summary of Development

The Proposed Action would result in no development of the Undeveloped/Unroaded Area No. 3 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 3,371 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct burn treatments in 26 acres of ponderosa pine, in 323 acres of pinyon-juniper, and in 33 acres of sagebrush. The ponderosa burn treatment would appear as a natural process to most viewers and would leave no evidence of human activity. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon-juniper to carry the fire, it is expected that most of the felled wood would be consumed. None of these activities would have long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine treatment. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 3,371 acre Undeveloped/Unroaded Area No. 3 would offer the possibility of being combined with the 6,000 acre New Home Bench IRA and the 2,090 acre Undeveloped/Unroaded Area No. 4 . If this were to happen, the 11,461 acre IRA would gain a more easily identifiable boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

Undeveloped/Unroaded Area No. 4 (2,090 acres)

Summary of Development

The Proposed Action would result in no development of the Undeveloped/Unroaded Area No. 4 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,090 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
The Proposed Action would conduct burn treatments in 224 acres of pinyon-juniper, and in 33 acres of sagebrush. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon-juniper to carry the fire, it is expected that most of the felled wood would be consumed. These activities would not have long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine burn only operation would affect the opportunities for solitude and primitive recreation to an even lesser extent. The period of interruption in any of the above treatments would be of short duration. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 2,090 acre Undeveloped/Unroaded Area No. 4 would offer the opportunity of being combined with the 6,000 acre New Home Bench IRA and the 3,371 acre Undeveloped/Unroaded Area No. 3 . If this were to happen, the 11,461 acre IRA would gain a more easily identified boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

4.2.3.3 CUMULATIVE EFFECTS OF PROPOSED ACTION ON ROADLESS/UNDEVELOPED

Introduction

Cumulative effects will be divided into two sections: 1) Effects on IRAs and 2) Effects on undeveloped/unroaded lands.

Effects on IRAs

With implementation of the Proposed Action, no acres would be developed in the four IRAs represented in the analysis area. The combined 133,192 roadless acres in those four IRAs and total of 305,806 roadless acres encompassed in the thirteen (13) IRAs in the CEA would remain as at

present. The anticipated Donkey/Park Ridge Vegetation Project on the Teasdale District is a foreseeable future action that may develop several hundreds of acres of the Boulder Mountain/Boulder Top/Deer Lake IRA. Both the Final Roads Rule and the President's recent Roadless Initiative are foreseeable future actions that may affect the number of acres of roadless in the CEA. Based on known information, if the Proposed Action were implemented, and the Donkey/Park Ridge project were to develop 750 acres, less than 1/2 of 1% of the available roadless IRA lands within the CEA would be removed from roadless/undeveloped.

Effects on Undeveloped/Unroaded Lands

With implementation of the Proposed Action, a total of 732 acres would be developed in the four Undeveloped/Unroaded Areas represented in the analysis area. This figure represents 7% of the combined 10,093 undeveloped acres in those four Areas. With the passage of time and a continuation of ecological processes, all 732 developed acres would eventually be returned to an undeveloped/unroaded condition. There are no other known projects that would cumulatively affect undeveloped/unroaded character within the CEA.

4.2.3.4 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Road building and associated maintenance in a roadless/undeveloped area is an irreversible commitment of the resource to a developed condition for the long-term. The Proposed Action would have no irreversible or irretrievable effects on these resources.

4.2.4 EFFECTS OF THE PROPOSED ACTION ON VISUAL QUALITY

Effects on Visual Quality by the various actions is measured by the amount of visual changes that would take place and their duration. Achieving long-term visual quality goals in a forest environment is a dynamic process. Vegetative treatments sometimes cause temporary periods of unacceptable visual changes, therefore it is important to plan actions so that an attractive sequence of views is maintained and Visual Quality Objectives (VQO's) are met.

The following discussion of the Proposed Action will describe expected changes in the visual landscape within the Pretty Tree Prescribed Fire Project area viewshed. It will be discussed in terms of the effects on the visual elements (form, line, color and texture) expected.

4.2.4.1 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION ON VISUAL QUALITY

Guidance for this section is found in the Visual Management System, Agriculture Handbook No. 462, NFLM, Vol. 2. The Proposed Action would treat between 12,952 and 13,602 acres of the 33,938 acre analysis area and the effect would be greater diversity in vegetative species, size, color, texture and vigor.

The Dixie National Forest recently began the LRMP amendment process which will implement a different scenic resource management system, called the Scenic Management System (DNF, 1950 file letter, December 22, 1999). Should this system be adopted prior to implementation of this project, specific management area direction will be compared and analysis completed to ensure compliance with any newly issued standards or guidelines.

Visual Quality Objectives (VQO's)

The VQO's for the Proposed Action treatments would be as listed below:

Sagebrush

The Proposed Action would burn 200-250 acres after cutting and scattering PJ to carry the fire. Most of this management activity would occur near FR 153 and would meet a VQO of Retention. Other isolated sagebrush parcels would meet a VQO of Partial Retention.

Oak

The Proposed Action would burn 450-500 acres and repeat in 3-5 years if necessary. This prescribed burn would meet a VQO of Retention in the Foreground of FR 153 and Partial Retention in the Middleground of FR 153 because the treatment would replicate existing natural disturbance.

Pinyon/Juniper

The Proposed Action would cut and burn 3000-3500 acres with post treatment reseeding. All of the PJ treatment would occur in the Middleground of FR 153 and would meet a VQO of Partial Retention replicating the effects of natural fire disturbance.

Ponderosa Pine

This prescribed burn treatment would treat 7,000 acres and would meet a VQO of Retention in the Foreground of FR 153 and the Great Western Trail and Partial Retention everywhere else.

Mixed Conifer

This prescribed burn treatment would treat 300-350 acres and would meet a VQO of Partial Retention.

Aspen Burn

The Proposed Action would burn 700 acres of aspen with prior cutting of conifers and post treatment fencing if needed. A VQO of Retention would be met in the Foreground of the Great Western Trail and Partial Retention everywhere else.

Aspen Maintenance

Understory conifers would be cut in 1,000 acres of aspen. Treatment would meet a VQO of Partial Retention.

Aspen Regeneration Harvest

Within 1,332 acres, 302 acres of aspen would be cut in parcels not to exceed 40 acres in size. This treatment would meet a VQO of Retention in the Foreground of FR 153 and the Great Western Trail and Partial Retention everywhere else.

Travel Management

Under the Proposed Action, roads would be left open or closed in accordance with Map E.

Landscape Character

The Proposed Action would cause both short-term and long-term changes in landscape character in the analysis area. The character of the stands would change to a more open condition. The forest would be less compact and less dark with removal of some of the overstory and would display greater visual variety. This visual condition would be stable as the vegetation treatment would have reduced the chances of a major insect or fire disturbance.

Dominance Elements

As previously indicated, dominance elements are the simplest visual recognition parts which make up the characteristic landscape. The Proposed Action is discussed below in terms of changes in form, line, color and texture which would occur.

Form: This visual element is usually dominant because of the vast scale involved. Examples in the project area are the rocky ridges and the steep Sand Creek drainage basin. The Proposed Action would have no effect on the land and water forms of the project area.

Line: Live trees and snags provide important vertical line values to the forest landscape. In other instances, horizontal lines such as those made by a road bed, road cuts or fills present an unnatural contrast with the forest floor. With the Proposed Action, the verticality of some trees would be more evident because of the increased openness of the forest canopy. The height of the remaining trees would be more evident in relation to the newly seeded and naturally regenerated grasses and forbs on the ground. Any existing road scars currently visible in the middleground of FR #153 would remain visible. After one growing season, proposed skid trail systems would not be expected to create unnatural landscape lines when viewed from major travel corridors.

Color: Overall, the color element in the landscape would be increased substantially with the Proposed Action. In the short-term, disturbances created by the proposed vegetation treatments would result in more earth browns and burnt blacks showing. After one growing season, reseeded and naturally regenerated grasses and forbs would restore the yellow/green colors that would contrast pleasingly with the light aspen greens and the darker greens of the conifers. The grayish brown color of snags would continue to contrast with the dark green conifers and the grayish white trunks, spring greens and fall yellows of the aspen would increase as they proliferate due to patch-cuts and burns. Any white sawed log ends and black partially burned slash originating from this action would be removed from Sensitivity 1 road and trail Foreground zones. The creation of large bare brown soil areas from the construction of landings and skid trails would reduce visual quality in the short term. These effects would be unnoticed after one growing season. The riparian areas would continue to display the present variety of colors.

For trail users, there would be a short-term visual impact since they are traveling at a slow pace and since some trails pass directly through proposed aspen burn units. The opportunity of observing what may be unacceptable visual disturbances to some would be increased until the blackened areas were covered again with new growth. In trail Foreground zones, the mitigating measures stated in Chapter 2 would be applied to keep and/or bring impacts within the parameters needed to meet the appropriate VQO's.

Texture: Under the Proposed Action alterative, the overall vegetative texture would become somewhat more coarse as various sized openings are created by the vegetation treatments. Any future openings in the more open forest landscape would be less noticeable than at present. Proposed treatments would promote greater irregularity in canopy levels, maintaining textural variety in both the short and long term.

Summary: The desired VQO's would not always be met within the foreground and middleground of primary roads and trails in the analysis area because of debris left from previous sales or treatment activities. Under the Proposed Action, these areas would remain as at present.

The Proposed Action does not conflict with the LRMP. The Plan allows timber harvest in the affected management areas and specifies enhancing visual quality. This action would move the project area toward the desired future condition of having increased visual variety through stimulation of aspen clone regeneration and through creation of a greater size range in the conifers.

4.2.4.2 CUMULATIVE EFFECTS OF THE PROPOSED ACTION ON VISUAL QUALITY

With this alternative, the analysis area would become more visually attractive to recreationists. There would be no cumulative visual effects from other nearby vegetation treatment projects. If the Hell's Backbone Road is someday officially designated as a national scenic backway, an increase in visitor use would occur, possibly accompanied by an increase in site degradation.

Other cumulative effects on the visual resource would be those described in Alternative C of the Sand Creek Soil Stabilization Project EA.

4.2.4.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

With the Proposed Action, events such as major wildfires and/or other disturbances would less likely change the visual setting. The extent of alteration would depend on the event itself.

No Irretrievable effects would occur to visual quality as a result of the Proposed Action. Because vegetation grows back over time, timber harvesting and other proposed treatments would not cause any irreversible impacts. Natural processes such as fire, wind, drought, and natural succession would continue. Visual changes observable from any of the system roads or trails would be subtle .

4.2.5 EFFECTS OF THE PROPOSED ACTION ON SOILS

4.2.5.1 DIRECT AND INDIRECT EFFECT OF THE PROPOSED ACTION ON SOILS

A soil erosion model was used to calculate on-site (treatment areas) soil erosion for each soil under treated conditions for each of the action alternatives compared to the current erosion rates of the no-

action alternative using procedures outlined in the publication Estimating Soil Erosion Losses From Utah Watersheds (Tew, 1973).

During the environmental analysis a critical soils area map, located in the project file (see also Map L, App. 3.), was developed which identified all the areas that would have a possible impact on the soil and water resources. Specific mitigation (soil and water conservation practices) were developed to either avoid completely or to minimize the potential damage to these resources.

All soils proposed for treatment were evaluated from the standpoint of soil erosion relative to soil loss tolerance thresholds (T values).

Logging harvest can damage the soil resource and decrease long term productivity of the soil. The major impacts are typically caused by soil compaction, surface disturbance, and fire effects. A goal when implementing management activities if is to protect long-term soil productivity and soil hydrologic function. On timber sales detrimental effect is defined as 15% reduction in inherent soil productivity potential (FSH 2509.18). The desired future condition following logging activities is that long term soil productivity and hydrologic function will be maintained on as many acres as possible, but at least 85% of the activity area. From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document. (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) SWCP's are implemented as timber sale contract provisions in timber sales (SWCP 14.01) and soil considerations in prescribe burn planning (SWCP 18.02). As part of the NEPA process, soils suitability was determined for tractor logging (SWCP 14.07), and unstable areas are excluded from timber sales (SWCP 14.05). During logging activities, sale area maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP 14.06). Log landings and skid trails are designated by the sale administrator (SWCP 14.08, SWCP 14.10) and actions are taken to control erosion during operations and before sale closure (SWCP 14.11-14.15, 14.18, 14.19). Logging is suspended when wet conditions may cause soil damage (SWCP 13.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996).
Fire has the potential to affect soils by consuming soil organic matter, altering the physical characteristics and increasing the solar energy absorbed by blackening the soil. Any of these may alter infiltration and erosion rates. However, none of the direct effects are likely to decrease the long term productivity if fire intensities and temperatures are kept low (Bayer, 1996). To ensure no detrimental effect to the soil resource in the project area, soil suitability was determined and unsuitable areas were excluded from logging and fire. Soils and vegetation information was used to exclude areas from burning and define precautions in others (see Map L, App. 3). Soil and watershed considerations are used in prescribe burn planning (SWCP 18.02, SWCP 18.03). Standards and guidelines defined in the Forest Plan will be implemented during logging and burning to ensure soil quality standards are met. Burning will be done when conditions will limit the intensity of the fire, and when burning in large blocks the pattern will be mosaic (not continuous). Logging will include designation of skid trails and endlining, and will be done only when soil moisture conditions are suitable. Where detrimental effects to soil has occurred, either by soil disturbance, compaction or fire intensity, erosion control measures will be implemented. These include seeding disturbed areas, waterbarring skid trails, landings and roads, and scarifying (if necessary) and seeding areas where fire has exposed mineral soil. Monitoring on the Dixie National Forest has shown that when these measures are taken direct, indirect, and cumulative effects are within Soil Quality Standards, and long term productivity is maintained (Bayer, 1996). From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document . (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) SWCP's are

implemented as timber sale contract provisions in timber sales (SWCP 14.01) and soil considerations in prescribe burn planning (SWCP 18.02). As part of the NEPA process, soils suitability was determined for tractor logging (SWCP 14.07), and unstable areas are excluded from timber sales (SWCP 14.05). During logging activities, sale area maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP 14.06). Log landings and skid trails are designated by the sale administrator (SWCP 14.08, SWCP 14.10) and actions are taken to control erosion during operations and before sale closure (SWCP 14.11-14.15, 14.18, 14.19). Logging is suspended when wet conditions may cause soil damage (SWCP 13.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996) (Bayer, 1997).

COMPARISON OF ALTERNATIVES SUMMARY TABLE

On-Site Soil Erosion: First Year Following Treatment (tons/acre/year)

Treatment	No Action	Proposed	Alt. 1	Alt. 2	Alt. 3
Aspen Regen	.03	.86	n/a	.62	.83
Aspen Burn	.03	.09	.09	.09	.09
Aspen Maint	.02	.05	.05	.05	.06
M. C. Burn	.05	.27	.27	.27	.27
Oak Burn	.06	.1	.1	.1	.1
P-J Burn	1.1	1.51	1.51	1.51	1.51
Pond P. Burn	.2	.47	.47	.47	.47
Sage Burn	1.2	1.91	1.91	1.91	1.91
Weighted Ave.	.40	.75	.71	.74	.75

Proposed treatment areas occur on following soils:

Aspen harvest (and Aspen harvest and burn) - soil map units 528, 538, 539 and 545
Aspen maintenance - soil map units 523, 538, 539, and 545
Aspen burn - soil map units 539, 543, and 545
Mixed conifer burn - soil map units 523, 534, and 545
Oak burn - soil map units 523, 532, and 545
Pinyon/juniper burn - soil map units 429, 432, 524, 529, and 532
Ponderosa Pine Burn - soil map units 523, 532, 534, 538, and 545
Sage Burn - soil map units 432, 441, 477, and 524

On-Site Soil Erosion

Soil disturbance associated with tractor logging in the harvest units, and the loss of canopy and ground cover in the burned areas will result in an unavoidable short term increase in on-site soil erosion. All treated areas will be within soil loss tolerance thresholds, even during the first year when erosion will be greatest. The recommended mitigations as well as the relatively low percentage of watershed area harvested would ensure that the likelihood of increases in sediment to streams due to treatment will not be measurable (see section 4.2.6). The treatment areas proposed for burning will not result in soil disturbance, but will experience loss of ground cover and canopy cover which will result in some increase in on-site erosion. Resprouting in the aspen and oak types should result in good ground cover within one to two years; recovery in other pine and mixed conifer, will take longer. None of the proposed burned treatment areas should result in severely burned soil conditions. If burn areas require, scarifying and seeding will be done to limit soil erosion.

Current erosion rates from the proposed treatment areas average .40 tons/ac/yr. Estimated erosion rates the first year following treatment are .75 tons/ac/yr. Erosion rates will decrease substantially each year thereafter. These erosion rates (both pre and post treatment are very low compared to the allowable 3 to 5 tons/ac/yr (soil loss tolerance threshold needed to maintain long term soil productivity).

Long Term Soil Productivity

Where prescribed burning is done, a loss of most of the fine ground fuels will occur, resulting in a release of nutrients held in those fuels. Fire associated with the proposal should result in leaving a sufficient amount of the larger fuels (large woody debris) for long term nutrient cycling to maintain soil productivity.

Harvest using mechanical equipment will occur only in aspen stands where soils are suitable for timber sales (SWCP 14.07). Compaction and displacement associated with timber harvest in the aspen will be restricted, and primarily to the designated skid trail system (utilizing old skid trails from previous harvesting wherever feasible). This mitigation will meet soil quality standards for long term soil productivity.

Forest Plan Consistency

This Proposed Action is consistent with the Land and Resources Management Plan of the Dixie National Forest would reduce the risk of high intensity fire effects on the soil resource due to catastrophic fire.

4.2.5.2 CUMULATIVE EFFECTS OF THE PROPOSED ACTION ON SOILS

The cumulative effects analysis area for long term soil productivity and on-site soil erosion is the project area itself. The intent is to ensure that proposed management on a project area does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past management activities, the proposed management activity, and foreseeable future management activities. Off-site impacts of sediment are discussed in the hydrology section of the NEPA document. Long term soil productivity is not affected by adjacent projects. Cumulative impacts to soil productivity are the result of additional projects on the same piece of ground, i.e. additional soil erosion, increased compaction, displacement, etc.

Soil quality standards include threshold values for amount of surface organic matter, soil erosion rate and amount of soil disturbance (Bayer 1996). Increased on-site soil erosion rates associated with timber harvest are typically expected to be near natural levels (Bayer 1996). Direct, indirect and cumulative effects from past and ongoing activities are within soils quality standards, and long term productivity is maintained, when unsuitable soils are excluded of from management activities and mitigation measures are applied to offset impacts (Bayer 1996). Unsuitable soils have been excluded through the planning process (LBS Vegetation Treatment Project), and mitigations have been implemented through prescribe burn and timber sale planning and administration.

Previous projects on any of the proposed treatment areas are timber harvests of approximately 10 years ago more recently and prescribe burn activities as part of the LBS Vegetation Treatment Project. Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management harvest systems were used within most of the ponderosa pine. The timber

harvests used a relatively high concentration of skid trails and logging roads. The Affected Environment, Soils section states that under current conditions none of the areas proposed for treatment exceed soil quality standards. Ongoing LBS Vegetation Treatment Projects include pinyon juniper prescribe burning along Hells Backbone Road and aspen harvest in the Road 566 area. Past and present management activities in the Project Area include road maintenance, livestock grazing, fuelwood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, trail riding with mountain bikes and Off Highway Vehicles (OHV's).

Other current management activities that are occurring within the Analysis Area include livestock grazing and dispersed recreational use (hunting, camping, fishing). The proposed mitigation of restricting skidders to skid trails, endlining, and restricting logging when soils are too moist, should result in acceptable cumulative impacts to the soil resource (i.e., minimize increase in compaction, displacement, puddling). As described above, there should be sufficient large woody debris left on site following treatment for long term nutrient cycling which will maintain soil productivity.

Foreseeable future management activities within the Analysis Area include LBS Vegetation Management Project and Sand Creek Soil Stabilization Project. The on-going Sand Creek Soil Stabilization Project is rehabilitating and reconstructing, and closing roads in the Sand Creek watershed that were eroding and/or contributing sediment to streams due to improper location, lack of maintenance and/or lack of proper drainage. The project also incudes rehabilitation of gully systems in the vicinity of sand and Grimes Creek. The project has improved site productivity and reduced sediment delivery from gullied areas to Sand Creek.

4.2.5.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be short term unavoidable increase in on-site soil erosion.

Short Term vs. Long Term Productivity - Burning will result in a release of nutrients immediately following the fire. There should be sufficient large woody debris left on site for long term nutrient cycling and soil productivity.

Irreversible/Irretrievable Commitments - There should be no irreversible commitments to the soil resource. The portions of the treatment areas dedicated to permanent skid trails and landings are an irretrievable resource commitment (timber production is lost from these areas so long as they remain part of the transportation system servicing the area).

4.2.6 EFFECTS OF PROPOSED ACTION ON WATERSHED

4.2.6.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON WATERSHED

If the Proposed Action is implemented, the transportation and vegetative management activities summarized in Chapter 2 would be implemented. Transportation management would be implemented to close roads within the project area which are no longer necessary for administrative use. Seasonal closure would also be implemented on many roads within the project area. An OHV loop would be developed from the trailhead at the end of Road 566 around Haw's pasture and back through Road Draw road. An area closure which would prohibit vehicular travel off of roadways and designated trails would also be implemented.

Actions Common to All Action Alternatives

Included in all proposed alternatives' designs are soil erosion and water quality considerations. Areas which could result in excessive water or wind erosion are excluded from the proposed burn treatment areas (see App. 3 Map L). Proximity to stream channels are considered and included in project design and mitigations to be applied to all alternatives (see mitigations section, Chapter 2). Timber sale design will be done incorporating best management practices in the form of Soil and Water Conservation Practices (SWCP), as described in Forest Service Handbook (FSH) 2509.22. Examples of SWCP to be implemented are limiting skidding to designated skid trails and suspension of skidding operations during times of high soil moisture conditions (SWCP 13.06). Skid trail layout will include spacing and other requirements which are standards defined in the LRMP. The proposed harvests would use buffer strips to protect water quality from the potential water quality impairments (SWCP 13.03). No burn or harvest activities would be performed within 100 feet of the edge of perennial streams, riparian areas, springs water bodies, and wetland soils (see App. 3, Map M). Also, no timber harvest would be done within riparian areas.

Road reconstruction and OHV trail construction will incorporate best management practices such as crossing stream channels at right angles and stabilization of cut and fill slopes (SWCP 15.10). Road closure will include stabilization of the existing roadbed where it is evident closure alone will not restore the area to acceptable rates of erosion within 2 to 3 years. This generally means where there is evidence of roadbed erosion, such a ruts. Stabilization measures generally include construction of drainage devices and seeding and more specific requirements for near streams. Road closures will be done in accordance with specifications in "Pretty Tree Bench Project, Sediment Reduction Plan for Road Closures", in the project file.

Summary Of Alternatives' Treatment Proposals , By Watershed

Vegetative Treatment, Percentage (%) of Watershed Area, by Watershed								
	Sand Creek				Boulder Creek			
Treatment/Alt.	Prop	Alt. 1	Alt. 2	Alt. 3	Prop	Alt. 1	Alt. 2	Alt. 3
Asp Har. Main.*	0.73	0.71	0.73	0.73	0.57	0	0.04	0.57
Aspen Burn *	0.22	0.6	0.6	0.66	1.36	1.72	1.75	1.72
Aspen Maint.	0.77	1.51	0.77	0.77	0.08	0.65	0.08	0
Aspen Harvest *	0.25	0.25	0.25	0.39	0.23	0.13	0.02	0
Mix. Con. Burn	0.1	0.1	0.1	0.1	0.54	0.54	0.54	0.54
Oak Burn *	1.03	1.03	1.03	1.03	0.76	0.76	0.76	0.54
P-J Treatment *	4.76	4.76	4.76	4.76	3.36	3.36	3.36	3.36
Ponderosa Burn	13.77	14.23	14.23	14.13	5.03	5.03	5.03	5.03
Sage Burn*	0.95	0.95	0.95	0.95	0.82	0.82	0.82	0.82
Total	22.6	24.14	23.42	23.53	12.75	13.02	12.41	12.58
Veg. Rem Sum *	7.94	8.3	8.32	8.52	7.1	6.79	6.75	7.01
* represents treatments which remove virtually all vegetative cover								

Water Quantity and Streamflow Regime

Trees have a direct influence over the amount of precipitation input available for stream flow because they transpire water, intercept precipitation which is then evaporated or sublimated directly back into the atmosphere, and modify the understory evapotranspiration environment (Kaufmann et. al, 1987). Any factor that reduces basal area or Leaf Area Index (LAI) of the forest will increase runoff to some degree (Shepperd et. al, 1991). Following fire or harvest, loss of ground cover and change in vegetation type (such as proposed in aspen or pinyon/juniper stands) will cause changes in

infiltration and runoff. In aspen stands, where the objective of harvest and prescribed burning is to kill all the trees, the fire will also result in lower transpiration rates, especially during 3 years following the burn, but also in the longer term (Gifford, 1983). Where conifer has been killed in favor of deciduous trees (such as in aspen maintenance areas), more solar radiation will reach the snow surface and a more rapid snowmelt is expected (Dunne and Leopold, 1978), and transpiration will decrease (Gifford, 1983).

These changes may or may not increase streamflow or timing of streamflows, depending on treatment site locations and natural variations in precipitation, snowpack and rate of snowmelt. Streamflow changes also depend on the percentage of watershed area treated and watershed characteristics (Kendall, 4/1997). Studies on the effects of burning on water yield have been done mostly on high intensity fires, and information on moderate or low intensity fires is scarce. Applying the analogy of a burn as a vegetative removal, studies of vegetative removal may be used to predict loss of vegetation due to fire. Considering only vegetative removal, it has generally been noted that 20% to 30% of a watershed must be harvested before a significant change in flow can be noted (Troendle, 1982). A watershed experiment in northern Utah which harvested 13% of the watershed using aspen clearcut showed no measurable increase in water yield (Johnston, 1984). A review of 94 catchment experiments concluded that when vegetative cover is removed, all but 1 resulted in an increase in water yield, however results were not consistent regarding that amount of the increase, length of treatment effect, or the effect on stream flow and timing or peak flows (Bosch and Hewlett, 1982).

In areas where tree cutting and prescribed fire kills trees (see summary table), water yield is expected to increase. Burning which removes vegetation, and harvest, would reduce canopy closure and basal area. A decreased basal area would result in local increased water yield and may result in a small increase in runoff from the affected areas (Johnston, 1984, Troendle, 1982). Summer time evapotranspiration is influenced by forest type and structure (Troendle, 1982). At the watershed scale the Proposed Action would maintain present forest type and structural characteristics (summary table documents that less than 8% of the affected watersheds will undergo a vegetative change during the time span of the project). Vegetation in lower elevations (primarily P-J stands) utilize summer precipitation and stored water in the soil, and causes a depletion of excess soil water during the summer months (as evidence by the lack of springs, see app 3, map M). Following aspen treatment there is not expected to be a surplus of water available from harvest areas during summer months (Johnston, 1984). Therefore, the majority of the water yield increase from the project area would be during spring runoff, and would not be discernible from larger, natural variations (Troendle, 1982) (Johnston, 1984).

Water Quality

Burn Activities

The Environmental Consequences, Soils section predicts that prescribed burning on the proposed treatment areas will result in a loss of most of the fine fuels while leaving sufficient larger fuels required for nutrient cycling. Burning will not result in any direct soil disturbance, but will cause loss of ground cover and canopy cover, resulting in an increase in on-site erosion. This increase would be well within soil loss tolerance thresholds (see section 4.2.5). Following fire, erosion rates within burn areas will increase but long term elevated erosion rates are not expected (USDA Forest Service 1981, Elliot 1998). The amount of increase is extremely variable and is a function of the intensity of burn, slope, and proximity to streams. Water quality degradation may result from excessive amounts of nutrients, sediment or detritus (Kendall, 1/1997), and water quality standards may be exceeded in short term due to storm runoff. These effects will be minimized by conducting burns in accordance with burn plans (SWCP 18.02) and applying mitigations as part of the project plan (see

Chapter 2, Mitigations section). Watershed monitoring on the Dixie National Forest has indicated that when prescribe burning is done within burn parameters, no short term adverse effects to hydrologic function and short term soil loss is minimal (Dixie National Forest, 1997; Dixie National Forest, 1998). Included in mitigations are the use of no burn areas (buffers) to limit sediment delivery to stream wetlands and riparian areas. Buffers, or Streamside Management Areas (SMAs), are widely recognized to be highly beneficial to water quality and aquatic habitat (EPA, 1993). Vegetation in SMAs reduces runoff and traps sediments generated from upslope activities, and reduces runoff before it reaches surface waters (same reference).

Harvest Activities

A summary of forest management practices from nation-wide studies shows that forest practices have the potential to degrade the quality of water in streams by altering temperature, lowering dissolved oxygen concentrations, and increasing the concentration of nitrate-N and suspended sediment. In most cases, retention of buffer strips keeps the maximum increase in stream temperature to less than 2 degrees Centigrade. Depletion of streamwater oxygen is also rare in current harvesting operations. Minimizing inputs of fine organic debris into streams prevents creation of high biological oxygen demand. Nitrate concentrations may be increased by forest harvesting, but the summary concluded that harvesting does not degrade water quality by increasing nitrate concentrations in streamwater, with the possible exception of the Hubbard Brook forests (northern hardwood forests). The summary concluded that the major concern associated with silvicultural practices is suspended sediments. In this study it was concluded that use of Best Management Practices generally minimizes suspended sediment concentrations (Brinkley and Brown, 1993).

State of Utah, Best Management Practices applied to the harvest operations will be in the form of Soil and Water Conservation Practices (SWCP's). Monitoring of past timber sales on the Dixie National Forest during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation (Dixie National Forest, 1995; Dixie National Forest, 1996; Dixie National Forest, 1997; Dixie National Forest, 1998). The State has determined that use of SWCP's is adequate mitigation to reduce sedimentation (USFS, 1993). SWCP's are applied with an emphasis on skidding operations. Specific contract requirements which implement SWCP`s are included in the timber sale contract provisions. In addition to the SWCP's listed in the Soils Section 4.2.5, which are designed to protect the soil resource. Additional SCWPs are routinely incorporated into timber sales on the Dixie National Forest which are not identified as mitigations in this document to protect water resources. These include designating springs, perennial stream courses, wetlands and seeps and on the timber sale map (SWCP 14.03) for protection during the sale (SWCP 13.03, SWCP 14.17).

Travel Management

During project implementation, construction of the OHV trail will contribute sediment to streams at stream crossings, including Bear Creek and a tributaries to Bear Creek. Water quality standards may be exceeded for short periods of time during construction. A trail construction erosion control plan (SCWP 15.03) will be used to incorporated measures to minimize sediment contribution from construction activities. Measures will include specifications for timing of construction activities (SWCP 15.04), slope stabilization (SWCP 15.05), and control of permanent drainage (SWCP 15.07). Trails design at stream crossings will incorporate SWCP's, such as crossing stream at right angles and proper drainage at crossings; these measures will ensure sediment contribution from the trail will be minimized. Stream alteration permits for stream crossings will be acquired from the State where necessary by law. By incorporating SWCPs into project activities effects on the stream system will be limited to areas immediately below the proposed crossings, and trail construction will not

adversely affect Beneficial Uses of water downstream; this is in compliance with State nonpoint source water quality laws.

Travel management activities other than OHV trail construction, including road closures, are expected to have an overall favorable effect on water quality in the long term. During and following soil disturbing activities erosion rates can be expected to increase until disturbed areas are stabilized, typically 3-5 years (USDA Forest Service, 1981). Utilizing BMPs, previously described in this section under "Action Common to all Action Alternatives" heading, will ensure that impacts to water quality are minimized and in compliance with State an Federal water quality laws.

Considering the above discussion, it is not expected that beneficial uses of water will be impacted.

Forest Plan Consistency

The Proposed Action is consistent with the LRMP of the Dixie National Forest, more specifically implementing the project will not violate watershed related Standards and Guidelines described Chapter IV of the LRMP. The Proposed Action, if implemented, would reduce the risk of cumulative watershed effects due to catastrophic fire.

4.2.6.2 CUMULATIVE EFFECTS OF THE PROPOSED ACTION ON WATERSHED

The cumulative effects area for watershed analysis includes the drainages that receive water from within the Project Area, Sand Creek and Boulder Creek. Flow from these drainages is used for culinary year round, and irrigation downstream during the months of May to October. During the remainder of the year this water flows into the Escalante River, then to the Colorado River.

Past and present management activities in the Project Area include road construction, road maintenance, timber harvest, livestock grazing, fuelwood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, and trail riding with mountain bikes and Off Highway Vehicles.

Recreation access to McGath Lake is via poor road locations that have steep grades and that are located through the center of wet meadows. Past management activities including terracing and seeding gully areas are evident. The Affected Environment, Soils section of this document identifies several existing conditions within the cumulative effects area, including inadequately maintained and poorly located roads, gullies, and a slump. These have been addressed in a NEPA analysis, Sand Creek Soil Stabilization Project.

Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management systems were used within most of the ponderosa pine. Timber harvest activities resulted in construction of skid trails and logging roads. The Affected Environment, Soils section state's that under current conditions, none of the areas proposed for treatment exceed any of the soil quality standards.

Water and sediment yield is expected to increase slightly due to harvest activities. The water yield increase would occur during spring runoff, and would not be measurable compared to natural variations. Increased sediment yield from project activities are not expected to contribute measurably to existing sources within the watershed. These conclusions indicate that the project will not significantly contribute to cumulative watershed resource effects.

4.2.7 EFFECTS OF PROPOSED ACTION ON FISHERIES

4.2.7.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON FISHERIES

This alternative would not adversely affect fisheries. The mitigations described in Chapter 2 would serve to minimize sediment transport to stream channels. This alternative would contribute to enhancing the health of the vegetation communities within the analysis area. Healthier vegetation conditions in turn contribute to healthier watershed conditions by reducing the trend toward unstable vegetation conditions and the potential for large wildlfires, which could adversely affect the aquatic systems with high levels of sediments and reduction of riparian shade.

Forest Plan Consistency

This Proposed Action is consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired watershed condition.

4.2.7.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON FISHERIES

This alternative would not result in adverse cumulative effects to fisheries. This alternative would lessen the potential for a high-intensity large-scale wildlfire within the analysis area. This beneficial effect would contribute to reducing the potential for a wildfire within the analysis area to spread beyond into the remaining area of influence.

4.2.8 EFFECTS OF PROPOSED ACTION ON WILDLIFE

4.2.8.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON WILDLIFE

General Habitat Conditions

Implementation of this alternative would contribute to meeting the proper functioning condition of the habitats on the larger landscape, which in turn, would contribute toward maintaining a diversity of wildlife and plant species. This alternative would introduce various disturbances to the principal habitats, which, in overall effects, would resemble natural disturbances for wildlife and plant habitats, and provide some of the habitat conditions needed to maintain the diversity of wildlife and plant species which evolved with and inhabit these habitats conditions.

Within the **aspen habitat** this alternative would provide greater diversity in habitat conditions, with a greater diversity in species and a greater potential to sustain those species over time. From the current habitat condition that is predominately mid to late age-class aspen with moderate to high conifer encroachment, this alternative would provide the following habitat conditions:

- about 35% of the aspen habitat in a young age-class habitat condition, (about 24% with high snag density; about 11% with lower snag density.)
- about 30% of the aspen habitat in a relatively pure aspen stand of mature to old age-class condition, and
- about 35% of the aspen habitat left in mature to old age-class with varying amount of encroaching conifers.

Two treatments would increase the percentage of young age-class from about 5% of the aspen habitat to about 35% of the habitat. About 700 acres of mid to late age-classes would be burned and

about 302 acres of mid to late age-classes would have regeneration harvest applied. With the accomplishment of 160 acres of aspen regeneration treatment under the LBS VEGETATION TREATMENT PROJECT, about 1162 acres of young age-class habitat condition would be provided, increasing this habitat condition to about 35% of the overall aspen habitat. This 35% approximates the percentage that's consider to have occurred naturally prior to the era of fire suppression. The 700 acres of burning would be left with a high density of dead trees distributed across the treated acres and occasional live trees left, in clumps and individually, over a developing young age-class condition. The 302 acres of harvest regeneration would provide a young age-class condition with an averaged retention of three snags and defective trees per acre average for treated acres, left in scattered clumped.

Of the remaining aspen habitat, which is of mid to late age-classes, about 1000 acres with moderate density of encroaching conifers would be treated to remove the conifers. This treatment, on about 30% of the overall aspen habitat, would prolong the presence of dominant aspen habitat in the mid to late age-class condition that is preferred by wildlife species favoring pure aspen stands. The remaining mid to late age-classes of aspen, about 36% of the aspen habitat, would be left with varying amount of conifer encroachment and accommodate a diversity of species which favor a mixed conifer/aspen habitat condition.

The aspen habitat is the only principal habitat which would have multiple prescriptions applied, each resulting in different habitat conditions. The maintenance prescription would re-establish a habitat condition of dominant aspen in a mature to old age-class condition. The burning and the harvest would both create young age-class condition. Both prescriptions would accommodate wildlife species associated with early young age-class condition. The burned acres would also accommodate a higher number of bird species typically associated with mature forest conditions, due the additional density of residual snags and live trees and convoluted boundaries of the treated areas.

This alternative would apply a low-intensity underburn over roughly 30% of the **mixed conifer habitat**. This alternative would have several beneficial effects to the habitat and associated species. A low-intensity underburn would maintain a portion of this habitat in the open forest condition of mature overstory trees with reduced risk of loss by a wildlfire. This treatment would contribute to and help maintain a diversity of conditions within the mixed conifer forest habitat, which would benefit a diversity of wildlife species. Nutrient recycling, reduction in shading effect of the dense understory, and stimulation of understory shrubs, forbs and a component of grass vegetation would help maintain those plant species in the habitat. Enhancing the understory shrubs and herbaceous vegetation would further benefit wildlife species, as insects, small mammals, songbirds and predatory species, as goshawks and foxes, which rely on those smaller species for a prey source. An occasional overstory mature tree could be killed, per chance the fire climbed into the canopy. Such mortality would contribute to the large snag component, adding to the diversity in structure (snags) and in forest patches (small openings), benefitting wildlife species which depend on snags and which favor small patch-openings in the forest habitat.

This alternative would apply a low-intensity underburn across about 7000 acres of the **ponderosa pine habitat**. Reducing the risk of stand replacement wildlfire would provide the opportunity for this habitat to develop toward a diverse pine habitat which could promote and sustain wildlife and plant species which evolved with the natural ponderosa pine habitat.

Within the mid-age stands of the pine habitat, the underburn in the short-term wouldn't create an open forest habitat, due the current tree diameters and resistance to low-intensity fires. The underburn would be beneficial to wildlife and understory vegetation in several ways. Occasional

mortality would provide snags and small patch-openings in the forest habitat, both of which would be additional diversity for wildlife, and the small openings would also provide additional site conditions for a diversity of plants. Understory plant species, as shrubs, forbs and grass species, would benefit in the short-term in both the mid-age and the old growth pine stands.

With adequate fuels being non-uniform in distribution, a mosaic burn pattern would be expected. Burned areas would provide for nutrient recycling, heat stimuli for seed germination and respouting of young growth, and possible sprouting of species which has been dormant for many years due the lack of fire stimuli. Areas remaining unburned would retain a cohort of older age-class understory vegetation and continued source of seed until the younger age-class matures.

Patchy distribution of the understory vegetation age-classes would benefit wildlife species in providing patchy distribution of cover for some species, as small mammals, ground-nesting birds, amphibians and lizards, and young vegetation age-class as nutritional forage for other wildlife species, as turkeys, bears, deer and elk, as well as for many of the small mammals, ground-nesting birds, and variety of insects.

This alternative would burn roughly 20% of the **pinyon-juniper habitat**. This 20% is also expected to occur in a mosaic pattern. If the pinyon-juniper habitat in this analysis area has expanded its historical distribution by 60%, as considered for this habitat across the larger landscape, then this alternative's 20% reduction would partially contribute toward restoring the historical distribution of both the pinyon-juniper and the sagebrush habitats.

Within the overall pinyon-juniper habitat, areas to be identified for the proposed burning would be those that historically had naturally low to very low density of pinyon-juniper. Those areas are generally of terrain that is flat or of low gradient and of deeper soils, which historically were occupied by greater density and diversity of vegetation other than pinyon-juniper, as sagebrush and various shrubs and forbs (buckwheat sp., penstemon sp., etc.) and grasses. Due to lack of fires over large areas and to grazing, pinyon pine and junipers have dominated these areas, further crowding out the understory vegetation. Burning these sites to eliminate or substantially reduce the density of pinyon-juniper may be accompanied with adjoining slopes of pinyon-juniper incurring a mosaic pattern of burning.

Succession after fire begins with annuals and continues with mixes of perennial grasses, forbs, and shrubs, culminating with pinyon-juniper (Graham, et al. 1999). Burning these pinyon-juniper areas would result in two scenarios. Where burn intensity is high, the site would be converted from a pinyon-juniper habitat, reducing the overall acreage of this habitat. Where the burn intensity is low and the burn is more mosaic in pattern, the density of pinyon-juniper would be reduced. In both scenarios, the opportunity would be gained for re-establishing a diversity of shrubs, as sagebrush, forbs and grass vegetation on the burn areas. Increasing the sagebrush, forb and grass community and reducing the pinyon-juniper density would have a long-term benefit to a wide variety of wildlife species dependent on the understory vegetation for both forage and cover; species ranging from insects dependent on flowering forbs to deer and elk relying on winter forage.

Livestock consumption of the forage that would be made available would be minor over most of this pinyon-juniper habitat where fire would be prescribed, due to lack of water for livestock during the summer season. During the winter months, forage would be mostly utilized by deer and elk. Water would more likely be available in segments of the nearby streams. Also, deer and elk have the ability to forage much farther from water sources and consequently utilize the full areas that would be prescribed for burning.

Providing alternative forage areas within the pinyon-juniper habitat area has the possibility to reduce the dependency of deer and elk to utilize the cultivated pastures of the nearby private lands in Salt Gulch, thereby reducing the need for private landowners to protect their investments through depredation permits. Providing available forage to draw deer and elk away from private lands is a management emphasis of the Utah State Division of Wildlife Resources.

Other benefits realized with this alternative's burn in the pinyon-juniper habitat would be the re-establishment of many native plant species that are currently suppressed or excluded from areas by the dominating pinyon-juniper. Re-establishing a higher density of shrubs and herbaceous vegetation would have the added benefit of providing ground cover and reducing erosion which would contribute sediment toward stream courses and affect riparian habitats.

Artificial seeding in some areas of the prescribed burn is considered under this proposed action. Seeding would be achieved by hand application and would focus on two types of sites. The first would be areas identified after burning where there could be unacceptable erosion potentials before adequate natural vegetation recovery could be accomplished. The second would be areas where enhanced quantity and quality of forage vegetation would have the greatest benefit to wintering deer, elk and turkey, and serve to reduce the deer and elk reliance on private lands. Native species seeds would be emphasized, although an inclusion of non-native species seeds would be considered where such would help achieve the objectives of erosion abatement and enhancement of forage production. Inclusion of non-native species seeds is discussed further under NON-NATIVE WILDLIFE AND PLANT SPECIES discussion below.

This alternative would burn roughly 25% of the **oak habitat**, while maintaining roughly 75% in current condition. Current condition of this habitat consists of a predominately mature age-class, due to exclusion of fires during the past. Continued encroachment and shading by conifers in portions of this habitat further reduce the vigor of the oak. Burning would focus on older age-class portions of the oak habitat and which generally have a high degree of conifer encroachment.
Burning a percentage of this habitat would maintain an overall healthy condition of the habitat by reducing the encroachment effect and restoring a diversity of age-classes in the oak habitat. With the importance of this habitat to various wildlife species, maintaining the habitat's health and presence distributed within the analysis area would be an overall, long-term beneficial effect of the burning for wildlife.

As a prolific resprouting plant, new stem and leaf growth would be abundant and highly nutritional during the spring, and further summer-growth of branches would be available as a nutritional forage during the winter for deer and elk. In addition to deer and elk, other wildlife species would benefit, as insects that are leaf-eaters and those that depend on new branch growth for their reproduction via formations of oak galls. Insectivorous songbirds and brush-nesting songbirds would benefit with a flush of new resprout growth.

The important mast (acorn) production would be reduced on the burn acres for several years until the resprout of the oak matures for acorn production. This loss of mast production would be associated with 25% of the habitat while the remaining 75% of the untreated habitat would continue mast production for wildlife species which rely on oak mast. After several years of maturing, the younger age-class of oak would have the potential to be more productive in producing mast.
Within the **sagebrush habitat** the proposed action would burn between 200 and 250 acres; roughly 15% of the existing sagebrush habitat in the analysis area. Burning these acres would re-establish a variety of sagebrush age-classes within this habitat, provide an increased component of forbs and grasses, and reduce the encroachment of pinyon-juniper.

Burning would benefit wildlife and plant species in several ways. In addition to providing a younger age-class of sagebrush, burning would promote other vegetation species as available forage, by reducing the density of sagebrush occupancy of the sites and allowing other vegetation to occupy at a higher site density than present. A higher site occupancy and abundance of other plant species would help sustain the native plant species populations on site. With a higher abundance of other plant species, wildlife species would benefit, as deer, elk, insects, snakes, rodents, songbirds, rabbits, badgers, and raptors that would prey of the smaller species.

Artificial seeding is also considered for sites with potential for unacceptable level and for enhancing the quantity and quality of vegetation as cover and forage for wildlife species, including forage for deer and elk. Seeding would be achieved by hand application. Native plant species would be emphasized, though inclusion of non-native species would be considered where such would aid in achieving the objectives for erosion abatement and production of forage and ground cover for wildlife. Inclusion of non-native plant species is further addressed under NON-NATIVE WILDLIFE AND PLANT SPECIES discussion below.

An increase in sagebrush habitat acreage would also occur with this alternative. Burning of 3,000 to ,500 acres of pinyon-juniper habitat in locations which historically consisted of sagebrush communities would contribute toward restoring those acres to sagebrush community with a high component of other shrubs and herbaceous vegetation. Over most of the acres that the pinyon-juniper habitat has encroached and dominated, individual sagebrush and herbaceous plants are still present in low numbers. These individual sagebrush plants and herbaceous vegetation would contribute a seed source for re-establishing vegetation over most of the burn areas in the pinyon-juniper. Where existing seed source may be scarce or lacking, inclusion of shrub species in the artificial seeding would be considered to provide desired winter range forage for deer, elk and turkey, as well as providing cover for smaller wildlife species.

Open Road Density

This alternative would affect wildlife in two manners. The first would be a decrease in open-road density to 1.00 mile per square mile. This would result in less disturbance to wildlife within the analysis area.

Secondly, this alternative would increase the period of seasonal road and area closures in the Sand Creek drainage and the Sweetwater Creek drainage, by including all hunt periods, starting with bow hunting in August and ending after the last turkey hunt in late May. The area closure would not apply to over-the-snow motorized travel, as snowmobiles. Where snow accumulation would be sufficient for most snowmobile recreationists, most wildlife as deer, elk and turkey would not be in the same snow-depth zone, and consequently not harassed by such motorized activities. The effect of this extended road and area closure period would be a reduction in overall disturbance to wildlife from fall through spring.

Management Indicator Species

This alternative would benefit Management Indicator Species in the analysis area in the short-term and the long-term.

For **deer and elk**, there would be a substantial acreage increase in the forage ratio in the overall analysis area, from 16% to 31% as a result of treatments in the aspen habitat and the pinyon-juniper habitat. The aspen habitat would receive about 1,002 acres of new forage acres (700 acres of

burning and 302 acres regeneration harvest); a ratio increase from 5% to 35% for forage in the aspen habitat. The pinyon-juniper habitat would contribute between 3,000 and 3,500 acres of new forage acres with burning; increasing the forage ratio from about 5% to roughly 20% in the pinyon-juniper habitat. In addition, the forage provided would be of high quality associated with the young age-class of vegetation produced, as well as the high forage quality which would be achieved with burning in the oak, sagebrush, pine and mixed conifer habitats.

The Proposed Action alternative, as with all other action alternatives, would treat the "browse stands" of sagebrush and oak, increasing the treatment within a ten-year period in these stands from 1% to 19%. The treatment of 19% of the "browse stands" acreage is consistent with the Forest Plan that limits altering age-class of "browse stands" to 25% of the existing acreage within a ten-year period.

A substantial increase in forage quantity and quality, distributed across the analysis area, including summer range, winter range, and fawning/calving areas, should contribute to healthier populations of many wildlife species, including deer and elk. In addition to forage production, burning would provide additional diversity in habitat conditions which would benefit many other wildlife and plant species. The Proposed Action would contribute to meeting the States management plan emphasis to reverse pinyon/juniper recession and promote forage conditions within the winter range. This should also help reduce big game crop depredation on private land pastures.

The general periods for prescribed burning is from some time in March until sometime in June, then again in August until sometime as late as November. Each year could vary, depending on weather and fuel moisture, with some years suitable for burning throughout the year. The large acreage proposed for burning, the distribution of those acres across the analysis area, and the multiple seasons to achieve the burning provide the opportunity for scheduling areas to burn so to minimize disturbance to areas of high use by deer and elk during the fawning and calving seasons.

The **Merriam's turkey**, with its high dependency on young herbaceous and grass vegetation for forage, would benefit similarly to deer and elk with the increased acreage of young aspen stands, the conversion of some pinyon-juniper acres to shrubs, forbs and grasses, the reduction in understory true firs in the mixed conifers and old-growth pine, and the enhancement of understory forage in the pine, oak, mixed conifer, and sagebrush habitats.

Overall, available roosting trees would be maintained for a longer period with the reduction of competitive understory conifers in the mixed conifer and the old-growth pine stands and a reduction in potential for a stand replacement fire. In the mid-aged pine stands, an occasional mortality of a tree would provide the surrounding trees to gain more sunlight and potentially develop stronger lateral limbs suitable for roosting. The greater advantage in the pine and mixed conifer habitats would be the reduction in potential for a large stand-replacement fire.

The **northern flicker**, and associated secondary cavity nesters, would incur several effects from this alternative, relating to the aspen regeneration harvest, the aspen burn, and the underburns in the pine and mixed conifer habitats. The overall effect to cavity nesters would be beneficial in the long-term by providing a distribution of snags within the underburn areas and providing a greater stability and continuum of suitable habitat over time.

In the aspen regeneration harvest, an average of 3 snags or defective trees per acre average would be retained and distributed in clumps across the harvest units. The regeneration harvests would be in 40-acre or less units. The burned acres would vary in acreage-size from small to large. The short-term effect would be a high abundance of snags and fire-scarred live trees, useful as nesting and as

feeding sites. In the long-term, many of these retained trees will eventual fall and reduce the avail-ability of cavity trees on those acres of young aspen habitat condition created. This young aspen habitat condition would contribute in the long-term to the stable condition and future development habitat for cavity nesters.

Many cavity nesters that inhabit the mature forest adjacent the treatment areas would incorporate and utilize the peripheral acres of the treatment as part of their feeding and defended territories. Burning these acres of aspen would not fully result in these acres becoming unsuitable for nesting and foraging for cavity nesters. Non-uniform distribution of fuels and burn intensity would result in some clumps and individual trees surviving and remaining in the long-term, after the snags initially left have fallen. Many of these scattered clumps and individual would thereafter continue to serve as centers for nesting territories for cavity nesting birds, including the flicker.

This alternative would leave roughly 65% of the mature aspen habitat available for cavity nesters. The aspen acres burned and those harvested would contribute to future replacement of mature aspen habitat.

Underburns in the pine habitat and the mixed conifer habitat would be beneficial to flickers and other cavity nesters in the short-term. Though a few existing snags might be lost to an underburn, the burn is expected to cause an occasional mortality of overstory trees, which would provide new snags in firm condition with ability to remain standing for several decades. Likewise, an occasional live tree can be expected to incur some fire scarring, resulting in future defective live trees. The reduction in fuel loading and density of understory conifers would have a long-term beneficial effect by reducing the potential for a future large stand-replacement fire.

Burn treatments in the aspen, pine, and mixed conifers habitats, and portions of the oak, pinyon-juniper and sagebrush habitats in vicinity of the forest habitats, would provide additional diversity in habitat conditions, benefitting many cavity nesters by providing additional diversity in foraging opportunities.

The **northern goshawk** would benefit with the treatments in the forest habitats and in the adjacent non-forest habitats by having an increased diversity of habitat conditions and related diversity of prey species. The maintenance of these forest habitats, particularly the reduction in potential for a large-scale wildfire, would be a long-term benefit for this species.

Threatened and Endangered (T&E) Species

This alternative would have no effects to T&E wildlife and plant species. T&E species do not exist within the analysis area or rely on the analysis area as essential habitat. For the bald eagle, the spotted owl and the peregrine falcon, which might occasionally disperse across the area, the added diversity in habitat conditions could be beneficial for foraging purposes while dispersing across the larger landscape.

The closest area of potential Mexican spotted owl population would be in the canyons of the lower portion of Sand Creek. Though forming the southwest boundary of the analysis area, this canyon and portion of Sand Creek is within the wilderness, a quarter-of-a-mile and farther from actions proposed by this alternative, and would not be affected by actions of this alternative.

Should any T&E species be discovered and which any action of the alternative might affect, such action would be halted until consultation with the U.S.D.I. Fish and Wildlife Service (FWS) is concluded, as required by the Endangered Species Act of 1973, as amended.

Sensitive Species

This alternative would not result in loss of species viability nor need for future listing as threatened or endangered. This alternative would be beneficial to most of the Sensitive-listed species which inhabits or might inhabit the analysis area. With the exception of the three-toed woodpecker, this alternative would not incur any adverse impacts to Sensitive-listed wildlife or plant species, or their associated habitat.

Concerning the **three-toed woodpecker**, the impacts to this species' habitat would be a mix of adverse and beneficial impacts, with beneficial effects in the long-term and of no threat to the species' population viability. The adverse effect would be a localized loss of snags in the regeneration treatments of aspen; this occurring several years after the treatments when the snags begin to fall. Meanwhile, roughly 65% of the aspen habitat would remain available as mature and older aged class conditions, providing defective trees for feeding and cavity use. Being that this woodpecker is not dependent on aspen habitat, as it is on spruce habitat, the measure of adverse effect would be marginal and would not cause a population viability concern, especially considering the numerous acres of spruce habitat remaining on the Aquarius Plateau and the large circumpolar range of this species. Beneficial effect would be providing a stable continuum of aspen habitat over time, within the analysis area.

The adverse and the beneficial impacts to the three-toed woodpecker would roughly balance in the long-term, with the stability of species' population in the analysis area as the long-term benefit. An abundance of snags and defective trees on the acres of aspen burn and aspen harvest would be a short-term beneficial effect to the species. This species is known to be attracted to areas of high tree mortality. This effect would be short-term until those snags eventually fall, thereby reducing the number of snags available for foraging and cavity nesting on the 35% of the aspen habitat. Effects of aspen harvest with retention of snags and particularly the burning of aspen would not be substantially different than a natural fir disturbance regime, where the woodpecker is benefitted for a short-term.

Roughly 95% of the aspen habitat is in the mid to older age-class condition. A 30% reduction in the mature to old age-class condition would occur between the harvest and the burning. This reduction would likely reduce the number of potential nesting territories of the woodpecker within the aspen habitat, but would not equate to a similar 30% reduction in the species population that might reside within this aspen habitat. Nesting territories of this species would incorporate peripheral acres of the treated areas. Additionally, due non-uniformity in fuels, the 700 acres treated by broadcast burning would retain clumps and scattered individual live and fire-scarred defective live trees which would persist into the long-term and provide suitable nesting structures and nesting territories within the treated acres. The approximate 35% of the aspen habitat treated to young age-class would be considered similar to historical percentage prior to the era of fire suppression. These acres of young age-class aspen would contribute to the long-term maintenance of aspen habitat, which would be a long-term benefit to this woodpecker.

Underburns in the pine, oak, and mixed conifer habitats would have a short-term benefit, with the occasional mortality of some overstory trees providing for both feeding and nesting needs of the woodpecker. These occasional mortalities would be expected to occur in a wide distribution pattern across these approximate 8,000 acres treated, which would accommodate a large number of nesting territories, contributing toward off-setting a reduction in nesting territories that might be expected with the proposed aspen burn and harvest.

Underburns would reduce some future mortality of overstory trees by reducing the density and competition of the understory conifers. This effect would be off-set in the long-term with trees that received fire-scars becoming defective with eventual mortality occurring. The greater advantage would be the reduction in potential for a future large-scale wildlfire that could convert large acreages of mature to old growth forest habitat to a young age-class condition.

The **flamulated owl** which inhabits primarily the pine and mixed conifer habitats would benefit by underburning. Reduction in the density of understory conifers would benefit the owl's ability to forage on the forest floor. Enhancement in understory shrubs, forb and grass components would increase the diversity and abundance of the owl's prey species. Occasional mortality of overstory trees would contribute to potential nesting sites for the owl. The reduction in future mortality of overstory trees that would occur with induced stress from understory conifers would be off-set with the fire-induced defective trees and future mortalities. As mentioned above, the greater advantage would be the reduction in potential for future large-scale wildfire and the provision of stable continuum of suitable habitat.

For the **northern goshawk**, the Proposed Action would be consistent with the *"Conservation Strategy and Agreement for the Management of the Northern Goshawk Habitat in Utah"* (1998), which incorporates the recommendations of Reynolds et al (1992) for project designs. In general, this Proposed Action would be consistent with the intent of all alternatives decried in the *Utah Northern Goshawk Project Environmental Assessment* for promoting and maintaining goshawk habitat. This Proposed Action would vary from that assessment's alternative B and E in reducing the potential for extreme large scale fire disturbance within the analysis area and vary from that assessment's alternative E by promoting treatments in mature and old growth forest habitats within the analysis area. The Proposed Action is consistent with the recommendations identified by Graham et al (1999) in managing forested habitats to reverse the trend toward unstable forested conditions and contribute to the aim of sustaining habitat for the goshawk and selected prey. A key emphasis for Desired Habitat Condition made by Graham et al is to provide diverse forest cover types with strong representation of early tree species dominating the landscape.

Reynolds et al (1992) didn't address management recommendations for aspen habitats in reference to goshawk habitat. As stated in the *"Conservation Strategy and Agreement..."* (1998), application of the Strategy will be integrated at the landscape assessment level by field units, and that integration opportunities include watershed assessments, ecological unit assessments and Properly Functioning Condition assessments. The large created openings in the aspen habitat is within the historic range of variation for natural disturbance patterns, and the percentage of aspen converted to early seral age class is within the Proper Functioning Condition for this habitat. The size of the created openings would remove these acres temporary as suitable habitat for the goshawk. These openings would not, however, affect goshawk nest area, post-fledgling areas, or reduce the overall available forage habitat to less than 6,000 acres for any pair of goshawk.

Maintaining a healthy aspen habitat within the analysis would ensure sustaining current and future optimum aspen habitat for the goshawk and associated prey within the analysis area. The non-treatment of aspen stands currently in a healthy condition, the conifer removal within the aspen stands with light encroachment conifers, and the regeneration of aspen stands with higher levels of conifer encroachment and/or of high decadence are intended to maintain an overall healthy aspen habitat within the analysis area. A healthy aspen habitat within the analysis area would also contribute to the present and future function for connectivity of high value habitat patches across the larger landscape.

The regeneration treatments in the aspen habitat would provide a stronger representation of early seral (young age-class) for diversity in foraging conditions and future health of the aspen habitat, while maintaining the majority of the aspen habitat in mature to older age-class conditions. The stands of aspen that would be treated to provide early seral age conditions are those identified as unstable, with encroachment of conifers and/or high level of decadence. The percentage of aspen habitat provided as early seral age (early tree species) by this Proposed Action, in conjunction with other recent management actions, would be 35%. This percentage reflects the Draft Properly Functioning Condition - Process for the major Vegetation Types described earlier in the VEGETATION SECTION.

Unlike the forests addressed by Reynolds et al (1992) recommendations, managing aspen through use of small openings (i.e., 1/2 acres to 4 acres) would not be within the historic range of variation (HRV) for this vegetation type. The sizes of the created early seral aspen conditions of this Proposed Action are intended to be within the HRV that naturally occurred for this vegetation type. Managing for conditions (i.e., opening sizes, etc.) that are within HRV is our best indicator of what is sustainable. The early seral stages of aspen created by this action would contribute toward ensuring future healthy stands of aspen for long-term benefit to the goshawk and associated prey species. The early seral age condition of aspen created by this Proposed Action would not occur within nest areas or post-fledgling areas of goshawks, nor reduce the available foraging habitat below the recommended 6,000 acres for any pairs of goshawks.

The increased diversity associated with the oak, pinyon-juniper and sagebrush habitats adjacent to or near the pine and mixed conifer habitats would further contribute to diversity of prey species available to the goshawk. The underburning in the pine and mixed conifer habitat would diversify the understory vegetation for promoting diversity of prey species and provide structural diversity in the overstory with an occasional tree mortality. These underburnings are consistent with Reynolds et al (1992) recommendations for managing the densities of understory trees, providing small openings and snags, and promoting a diversity of prey species for the goshawk. An additional benefit would be the reduction in potential for a large-scale wildfire. Treatments in the pine and mixed conifer habitats to reduce the fuel loading, including ladder fuels, would contribute to maintaining and promoting these habitats toward stable forested conditions with large tree

In the vicinity of known goshawk nest sites, underburning would contribute to maintenance of the sites by reduction in ground and ladder fuels which could result in loss of nesting sites under a wildfire occurrence. To avoid disturbance to nesting goshawks and possible nest failures, underburning in vicinity of nest areas would occur only after determination that the sites are not actively occupied by nesting goshawks, or that any implementation activity would not be detrimental to successful nesting.

This alternative wouldn't have a measurable impact to the **spotted bat** or the **western big-eared bat** or their population viabilities, as these two species are not known to depend on this analysis area for essential roosting or wintering. For the western big-eared bat, foraging over the area would continue as is, with favored foraging areas being over bodies of water. For the spotted bat, additional foraging areas would be provided with the burns in the pinyon-juniper habitat and the aspen regeneration stands.

The **Colorado River cutthroat trout** would not be impacted in both the short-term or long-term. Mitigation measures addressed in the WATERSHED section will prevent unacceptable sediment delivery to fish bearing streams, including Dufrey Creek which contains a non-sustainable population of introduced CRCT. Currently, pure strains of sustainable CRCT populations are not known to inhabit the streams within or downstream of the analysis area. This alternative would reduce the

potential of a future large catastrophic fire, and thereby reduce the potential for adverse impacts to streams in the area which might be re-introduced with the cutthroat trout at a future date.

The **Dana milkvetch** populations within the analysis are located in habitats proposed for underburning. With limited knowledge on the fire ecology of this species, these plants would be delineated and protected from activities associated with the underburning. Active management for these populations of Dana milkvetch would be addressed separately from the Pretty Tree Bench Vegetation Project decision.

The **Jone's goldenaster** and the **Neese's peppergrass**, which are located outside of the analysis area, would not be affected by this proposed action. If there are any undetected populations within a general area proposed for burning, such site(s) would be protected from burning by nature of their associated habitats. Any undetected sites would reasonably be within the pine habitat and of very sparse vegetation. Habitats for these two plants consist of rocky areas and rocky-sandy areas relatively devoid of fuels which would carry a fire. The primary objective of under burning within the pine habitat is to reduce fuels. The proposed action, as well as the other action alternatives, would not apply fire to sites void or with limited fuels to burn.

General Diversity Pattern

In all the principal habitats considered in this alternative, the general diversity pattern would be enhanced. This enhancement would be reflected in several ways; by addition of younger age-classes in habitats presently lacking such condition, as in the sagebrush; by increasing the diversity in understory conditions, as in the mixed conifer and the ponderosa pine habitats with increased proportions of herbaceous and shrub age-classes and diversity; and by restoring the distribution of sagebrush and general vegetation diversity within the expanded acreage of pinyon-juniper habitat.
A measure of wildlife and plants diversity would relate to the number of different species. The vegetative treatments of this alternative would result in greater diversity of habitat conditions, which would in turn promote diversity of wildlife and plant species.

This diversity of plants would include non-native plant species included with artificial seeding, in addition to diversity of native plant species derived naturally on-site. In general, the added diversity in wildlife and plant species would persist into the future as long as the diversity in habitat conditions persisted.

Non-Native Wildlife and Plant Species

The alternative would not promote additional non-native wildlife species.
This alternative would consider inclusion of non-native plant species with seeding conducted within the areas of the pinyon-juniper burns and the sagebrush burns. Areas selected for seeding would focus on those areas which might produce unacceptable levels of erosion after burning and those areas which would best benefit big game winter range needs and help to reduce the dependency of big game on the private lands. In each case, priority for seeding would be on burned sites which likely had a depauperate and/or eliminated herbaceous understory due to long-persistent, dense pinyon-juniper overstory and sagebrush overstory. Juniper-pinyon sites that have been void of understory species for many years will most likely lack a sufficient seedbank and natural recovery might not occur even if trees are removed (Stevens, 1999). A correlation is made for older stands of sagebrush with high canopy closure.

Presence of cheatgrass will likely persist in the analysis area regardless of treatments or non-treatments. Though the precipitin regime and the warm season flora of the analysis area is not ideal for promoting persistent, dense stands of cheatgrass, the disturbance effects of burning in the pinyon-juniper and sagebrush habitats would likely have an initial increase in the density and area coverage of cheatgrass in the burn sites for several years, until native grasses and forbs become re-established.

The burned areas of highest risk for long-term establishment of dense stands of cheatgrass would likely be sites where native grasses and forbs, and their seed banks, have been depleted by long-term presence of mature and old pinyon-juniper with a high canopy closure. These sites would provide the least availability of healthy native understory and seeds banks to re-establish the sites. Unless sites are artificially reseeded, natural recovery is often ineffective. Without sufficient understory, exotic weeds, as the cheatgrass, can become established and dominate the area (Stevens, 1999). These areas are the higher priority sites to artificially seed after burning to establish native and acceptable non-native species and reduce the potential for cheatgrass to dominate the sites. No species or mix of species is likely to eliminate cheatgrass on warm exposures. Reduction of its influence is more realistic than eradication (Goodrich and Huber, 1999). Seeding can greatly decrease the influence of cheatgrass, but is not likely to exclude it (Goodrich and Rooks, 1999). Cheatgrass is considered a native of Eurasia, where it evolved with other Eurasian plant species. A mixture of perennial species of which some of the most likely to compete with cheatgrass are also of Eurasian origin (Goodrich and Rooks, 1999). The proposed action would incorporate a mixture of native perennials and non-native (Eurasian) perennials.

This alternative would incorporate the Dixie National Forest interim guideline for applying non-native plant or seed. Criteria for this alternative on selecting non-native plant species specify that such species are non-aggressive in dominating a site at the detriment of excluding native species and do not have a tendency to spread off-site and colonize adjoining areas. Such non-natives might or might not be long-persistent on site. Selecting non-aggressive non-native species would ensure that native species would persist and contribute to the ecological functions which evolved on the sites.

Availability and costs of seeds can vary by year, which would require that determination of actual seed species in a mixture to apply be made at a later date, prior to implementation. Selection of native and non-native plants species for adaptability to the pinyon-juniper and sagebrush sites within the analysis area and to meet the non-native species criteria of non-aggressive in spread and dominance would be made prior to implementation. Goodrich and Huber's study (1999) provide several non-native perennial species which can be effective to controlling cheatgrass while compatible with native species. Two studies conducted by State of Utah Division of Wildlife Resources are available for determining adaptability of species for the analysis area; the "Boulder Mountain Turkey Food Plot and Species Adaptation Study" conducted during the mid-1990's, and "Revegetation Prescriptions" of April 1991. The State-managed Great Basin Research Center in Ephraim, Utah has provided an initial recommendation for the pinyon-juniper and sagebrush habitats and will continue to be solicited for final recommendation of species (native and non-native) for seeding portions of the burns.

Wildlife Corridors

Existing wildlife corridors, either seasonal movement corridors or dispersal corridors, would not be significantly affected by the treatments in this alternative. This alternative would promote the concept of wildlife corridor for species associated with early age-class habitat conditions.

Pertaining to corridors for seasonal movements, as between summer and winter ranges, the vegetation treatments of this alternative would not impede wildlife capability to transverse the area. The extended seasonal closures within the Sand Creek and the Sweetwater Creek areas would facilitate daily movements by eliminating the disturbance caused by vehicular traffic in those areas during periods of normal seasonal movements.

Pertaining to corridors for dispersal across the landscape, the vegetation treatments of this alternative would enhance the dispersal of species associated with early age-class habitat conditions while maintaining adequate dispersal conditions for species associated with older age-class habitat conditions. The expansion of species associated with early age-class habitat conditions within the analysis area would provide greater distribution of these species and closer proximity of populations for species to disperse between. The majority of the older age-class habitat conditions and associated species would still remain within the analysis area, with suitable distribution for dispersing within and outside of the analysis area.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired condition for wildlife and plant habitats.

4.2.8.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON WILDLIFE

The area of influence for the cumulative effects analysis is the watersheds of Sand Creek and of Boulder Creek, that includes the analysis area and the immediate surrounding areas in the Sand Creek and Boulder Creek watersheds.

General Habitat Conditions

The higher elevations of the surrounding areas contain a high percentage of **spruce/fir habitat** interspersed with aspen habitat. This spruce/fir habitat (about 17,200 acres or 20% of cumulative effects area) is not affected by this alternative, and no indirect effects are anticipated as a result of this alternative.

Apart from the spruce/fir habitat at the higher elevations, the principal habitats in the surrounding areas are extensions of the same principal habitats described for the analysis area. The conditions of these habitats in the surrounding areas are also in similar conditions as described in the analysis area, providing similar functions for wildlife and plant species.

The treatments in the principal habitats within the analysis area would have no direct or indirect effects on the habitats in the surrounding areas, except that the reduction in the potential for a large fire occurrence in the forested habitats of the analysis area could reduce the spread of such a fire into the habitats of the surrounding areas.
Converting portions of the oak, aspen and sagebrush habitats to early age-class conditions and converting the understories in portions of the pine and mixed conifer habitats to early seral age-classes would contribute to the overall cumulative effects area's percentage of younger age-class conditions. Those increased percentages of young age-class habitat conditions for the entire cumulative effects area would still remain below historical percentages of young age-class conditions.

The **pinyon-juniper habitat**, totaling about 17,100 acres within the cumulative effects area, would be the only principal habitat that would incur a conversion of some acreage to a different vegetation habitat, namely to sagebrush with components of other understory vegetation. This alternative would reduce this PJ habitat to roughly 14,100 to 13,600 acres (roughly 18 to 20% reduction in pinyon-juniper habitat). This reduction in pinyon-juniper would contribute toward restoring sagebrush/grass communities previously lost to pinyon-juniper encroachment and dominance. Approximately 80% of the current pinyon-juniper habitat would remain within the cumulative effects area.

The **sagebrush habitat** would be the only principal habitat which would incur an increase in overall acreage, as well as incurring diversity in age-classes. This alternative would increase the current acreage from roughly 1965 acres up to roughly 5465 acres, with the burning of pinyon-juniper on 3000 to 3500 acres. This action would restore sagebrush habitat to locations which had once been sagebrush habitat before encroachment and dominance by pinyon-juniper. After implementation of this alternative, roughly 69% of the overall sagebrush habitat would be in an early age-class condition, with sparse canopy closure and with a high percentage of other understory vegetation. About 31% of the sagebrush habitat would remain in an old age-class condition with a limited percentage of other vegetation in the understory

Of the approximate 9600 acres of **aspen habitat** in the area, about 12% would be in an early age-class condition while the remaining 88% would remain predominately in mature to old age-class conditions. Of the approximate 1970 acres of **oak habitat**, about 20% would be in an early age-class condition. About 62% of the understory in the approximate 11,400 acres of **ponderosa pine habitat** and about 19% of the understory in the approximate 1860 acres of **mixed conifer habitat** would be in an early age-class condition.

Open Road Density

The open-road density within the cumulative effects area is below the Forest guideline of 2 miles per square mile. The decrease of open road density to 1.00 mile per square mile would result in a decrease within the cumulative effects area. This alternative does not include reconstruction of any roads.

Management Indicator Species

For the Management Indicator Species, the effects of the proposed actions would mostly be relative to the analysis area. However, for species such as elk, goshawk, and Merrian's turkey which transverse large home ranges and incorporate the surrounding cumulative effects area into their home range use, the treatments conducted within the analysis area would contribute to the overall habitat-effectiveness of these species' home ranges. Providing diversity of habitat conditions within these species' overall home ranges would enhanced forage and prey availability.

Threatened and Endangered Species

Threatened and Endangered species are not known to inhabit the cumulative effects area and would not be affected. Should a T&E species be discovered within the cumulative effects area, mitigation measures as described in Alternative 2 would be followed. Providing a diversity of habitat conditions and foraging availability within the analysis area further enhance the suitability of the overall cumulative effects area for landscape dispersal.

Sensitive Species

The treatments within the analysis area would benefit the goshawk and the flamulated owl beyond the analysis area. These two species are likely to have home ranges which extend beyond the analysis area and into the surrounding areas as well as from the surrounding are into the analysis area. The increase in diversity of habitat conditions within the analysis area would further enhance the overall habitat-effectiveness of their home ranges, by further increasing the diversity and availability of prey, as well as reducing the potential of large wildfires which would reduce their available habitat.

General Diversity Pattern

With most of the surrounding areas in similar habitat conditions as the current habitats within the analysis area, increasing the diversity of habitat conditions and associated wildlife and plant species within the analysis area would contribute to a greater diversity pattern for the overall cumulative effects area.

Non-Native Wildlife and Plant Species

There are no identified cumulative effects associated with non-native wildlife species. Inclusion of non-native plant species in seed mixtures applied for erosion control and forage enhancement in the pinyon-juniper and the sagebrush burn areas, and on disturbed sites elsewhere associated with the alternative's actions, would incur no cumulative effects to surrounding areas, with the criteria of selecting non-native plant species which do not have the tendency to spread off application sites and do not have the tendency to dominate to the exclusion of native plant species.

Wildlife Corridors

Wildlife corridors would not be significantly affected within the cumulative effects area. Pertaining to roads and motorized trails and effects to seasonal movement patterns, this alternative remains within the Forest Guideline for density of open-roads within the cumulative effects area. Relating to seasonal movements of wildlife species between summer and winter ranges, forest open-roads and trails may hinder daily movements of wildlife adjacent the open-roads, but would not impede seasonal movements.

Within the analysis area and the cumulative effects area as a whole, where there locally existed a high density of constructed roads, short local roads are prescribed for closure under previous decisions. As a result, existing open-roads are not clustered in high density within any specific location of the cumulative effects area. This facilitates wildlife utilization of the habitats throughout the cumulative effects area. This alternative retains the dispersion of open-roads with large acreages of habitat secluded between open-roads.

The extension of the seasonal closure periods in Sand Creek and in Sweetwater Creek to cover the period of August 20th until June 1st effectively covers the times of seasonal movements between summer and winter range areas. Though localized within the cumulative effects area, these two seasonal closure areas further facilitates the daily movements of wildlife species.

Pertaining to wildlife corridors for species' movement and dispersal across the landscape, which aid viability of species populations across the landscape, this alternative promotes the corridor concept

for wildlife and plant species associated with early age-class habitat conditions, while maintaining the corridor concept for species associated with mature to older seral age-class habitat conditions.

This alternative would maintain sufficient mature to old age-class habitat conditions to allow the movement and dispersal across the area by species associated with this older age-class conditions. The pine and the mixed conifer habitats would retain their overstories of mid age-class and mature to old growth age-classes, while providing younger age-classes of understory vegetation. The aspen habitat would retain about 88% of it's current mature to old age-class conditions, and the oak habitat and the pinyon-juniper habitats would each retain about 80% of their current older age-class. The sagebrush would retain about 87% of its current mature and old age-class condition.

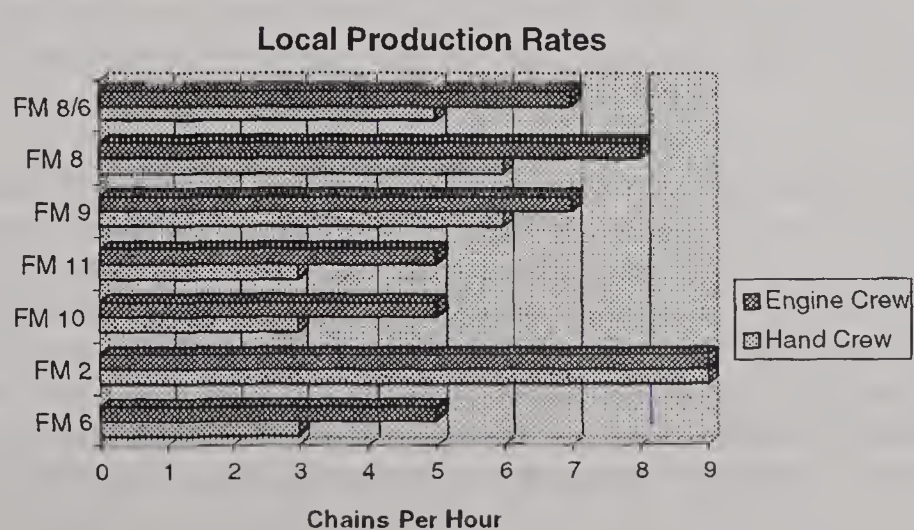
For species associated with early age-classes of these habitats, the alternative would provide conditions for expansion and further establishment of these species from sources within and from outside the area. This expansion of early age-class habitat conditions and associated species would contribute to greater distribution of these species across the landscape and closer proximity between populations.

4.2.9 EFFECTS OF PROPOSED ACTION ON FIRE

4.2.9.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON FIRE

Affects will be looked in terms of vegetation changes, associated fire behavior and probability of large fire occurrence. The document entitled "A Fire Management Strategy for the East Side Fire Management Zone" looked at this concept and is the basis for the following predictions, a copy of this document can be found in the project folder, with further information be found in the ESFMZ project folder.

The fire behavior characteristics by individual fuel models were entered into the BEHAVE Fire Behavior Predictions and Fuel Modeling System, Burn Subsystem FIRE1, CONTAIN program to determine if fires could be caught within the initial burn period by local resources. Prior to interpolating the results of the CONTAIN runs fireline production rates (fireline construction in chains per hour) needed to be determined. National standard production rates were used, and modified as necessary to reflect the local fire resource capabilities which consists of a type 6 engine (200 gallon tank, with 50 GPM pumping capacity) or a 3 person hand crew. Fire Behavior characteristics such ROS, FL and FLI for the appropriate FM are listed in Section 3.9.2. Fire behavior and associated costs will not be looked at in every FG. The following graph identifies local production rates.



Fire Group 0

The prescribed fire treatment within **sagebrush** would replicate the effects of natural fire disturbance and a FM 2 would be reestablished. The prescribed fire would create openings within the existing vegetation. These opening would be seeded as necessary. The number of wildfire starts would not change. As a continuous layer of fine fuels (grass) is established, fires may grow larger in size (when the grass is cured). However the intensity and duration of these fires would reduced. Prior to burning some cutting of pinyon-juniper with chainsaws may be necessary to create additional fuels to carry fire.

Utilizing the CONTAIN runs local resources are unable to catch a fire burning in FM 2 under any weather condition, this however is based on uniform weather, topography and fuels. Local resources can produce a greater amount of fireline per hour in FM 2 as compared to FM 6. The fine fuels within FM 2 would be consumed, and follow-up efforts would require less effort having a cost saving. As compared FM 8 and 6 would have a smoldering duff component which would require addition suppression effort and incur additional costs.

Fire Group 1

With the re-introduction of fire into the **pinyon** and **juniper** treatment area, fuel loads would be reduced to historical levels. The chance of a high intensity stand replacement crown fire would also be reduced. The prescribed fire treatment would replicate the effects of natural fire disturbance. The prescribed fire treatment would create openings; these opening would be seeded as necessary. The annual number of fire starts would not change but, the number acres burned annually may be increased due to the fact that a continuous source of ground fuels (grass and forbs) would be present within the treatment area. However the intensity at which these fires burn would be lower.

Currently most sites are classified as a combination of FM 8 and 6. Based on uniform weather, topography and fuels then utilizing the CONTAIN runs the local hand crew is unable to stop the spread of fire under any weather condition. The local engine would be able to stop the spread of lower intensity fires if vehicle access existed. These predictions for the combined FM 8 and 6 does not take into to account the ability to stop the spread of a crown fire, production rates are only based on a ground fire scenario.

Burning would move these sites to a FM 2. Based on uniform weather, topography and fuels then utilizing the CONTAIN runs the local resources are unable to stop the spread of fire under any weather condition. As stated the number of fire starts would not change, but the acres burned may increase per fire due to a continuous ground fuels. Fire spread would be limited to when ground fuels are cured sufficiently carry fire. Fires which would occur would be of low intensity and of short duration.

Relative humidity (RH) plays a key role on fire behavior. Fuel model 2 will generally only burn and spread when the RH is 15% or less (NWCG, Fire Behavior Field Guide, 1981). During the evening and night time hours the RH generally increases and these fires would go out. Fuel model 8 and 6 are capable of burning with higher humidities, these fires would burn until the RH is greater than 25-30% (NWCG, Fire Behavior Field Guide, 1981). During the night time hours the RH would generally increases enough to stop or slow the spread of fire. However, these fire would continue to smolder within the duff layer becoming activity again as the RH decreased the following day. The fine fuels within FM 2 would be consumed, and follow-up efforts would require less effort having a cost

saving. As compared FM 8 and 6 would have a smoldering duff component which would require addition suppression effort incurring additional costs.

Fire Group 2

With the re-introduction of fire into the **oak brush**, fuel loadings and stand densities would be greatly reduced within the treatment area. The prescribed fire treatment would replicate the effects of natural fire disturbance. New suckering would take place, thus stimulating the growth of new vegetation. The young suckering would be less susceptible to high intensity fires, than the older oak stands were. Fire suppression would be easier to accomplish since the severity would be reduced because of reduced fuel loadings and densities. Three to five years after the initial treatment, the treatment areas would be monitored to determine if fuel loads exceed 7-10 tons per acre. If fuel loads exceeded 7-10 tons per acre these acres would be burned again to further reduce fuels.

Burning would not change the FM. Controlled burning would reduce stand densities, both live and dead fuel loads. Fire line intensities would be reduced. As the fire line intensity decreases fire suppression personnel would have a higher success rate in future suppression activities. By reducing fuel loads, suppression efforts would take less time, and a cost saving would be incurred. Adjacent ponderosa pine would still be at risk of fire spreading into them from the oak, but the intensity of the fire spread would be lower.

Fire Group 3

With the re-introduction of fire within the **ponderosa pine** existing high fuel loads would be reduced to manageable levels. The burning would release valuable nutrients. These nutrients would be available for plant consumption. Burning would reduce the accumulating duff layer, and move fuel loadings toward the desired future condition. Burning would reduce ladder fuels which would carry ground fires into the canopy reducing the threat of a crown fire. The prescribed fire treatment would replicate the effects of natural fire disturbance. Existing fuel loads range between 8-16 tons per acre. Post burn fuel loads would be reduced to approximately 5-7 tons per acre of larger diameter material. Following treatment a small amount of scorch would occur and kill the lower needles which would drop to the ground within 1-2 years. Three to five years after the initial treatment was completed the same area would be burned again, further reducing ground fuels, and mimicking the natural role of fire.

The Document entitled " A Fire Management Strategy for the East Side Fire Management Zone" looked at the probability of fires which would within the ESFMZ excluding the Box-Death Hollow Wilderness, and for statistical purposes one large fire was also removed from the analysis. This analysis determined that there would be approximately 212 fires over the next forty years, burning nearly 900 acres. Suppressing these fires would cost approximately 4.4 million dollars (compounded to 40 years). It is anticipated that after the treatments proposed within this document the same number of fire would occur, however the number of acres burned may be reduced in half. Costs associated with suppression would also be reduced by 1.7 million dollars (compounded) (ESFMZ, P.Goetzinger 4/98).

By including fires which occurred within the wilderness and other large fires the probability of large fires increases over the forty year period. It would now be probable of having 243 fires, burning 3,125 acres, at a cost of approximately 9.5 million dollars (compounded). There is a 98 percent probability of having one fire reach 1,000 acres in size, and a 25 percent probability of one fire reaching 5,000 acres in size.

After treatment a FM 9 would be present. Flame lengths would be reduced by approximately 30% therefore less overstory mortality would occur. Fire line intensities would be reduced by nearly half. This would reduce the amount of cambium and root baking which would take place, as well as the amount of heat which is released through convection which would reduce the amount scorch to the residual stand. The rate of spread would not be reduced, but would generally remain constant (see fire behavior characteristics comparison in FG 3, section 3.9.2.4). However, fire suppression forces have a faster fireline building production rate, and much higher success rate in catching fires with fuels of these nature (ESFMZ, P.Goetzinger, 4/98). Therefore fires which occur within the treated areas would be caught in approximately half of time. By reducing fuel loads, suppression efforts would take less time, and a cost saving would be incurred. The probability of large fire occurrence would also be reduced.

Fires which started outside of the treated areas would continue to burn with greater intensity. As these fires burn into the treated areas the intensity would decrease and fire suppression personnel would have a higher success rate in stopping the spread of fire.

Fire Group 5

With the re-introduction of fire within the **mixed conifer**, existing high fuel loads would be reduced to manageable levels on those treated areas. Burning would reduce the accumulated duff layer, and move fuel loadings toward the desired future condition. Burning would reduce ladder fuels which carry ground fires into the canopy The prescribed fire treatment would replicate the effects of natural fire disturbance. Existing fuel loads range between 10-20 tons per acre, post burn fuel loads would be reduced to approximately 10-15 tons per acre of larger diameter material. At the 97th percentile weather flame lengths would be reduced from 5.9 feet to 1.2 feet thereby reducing overstory mortality. Fire line intensities would be reduced by approximately 80%. This would reduce the amount of cambium and root baking which would take place, as well as the amount of heat which is released through convection, which would reduce scorch to the residual stand. At the 97th percentile weather rates of spread would be reduced from 9 chains per hour to 1.2 chains per hour. Fire suppression forces have a faster fireline building production rate, and much higher success rate in catching fires with fuels of these nature (ESFMZ, P.Goetzinger, 4/98). Suppression of unwanted wildland fires would be less time consuming, costs associated with suppression would therefore be reduced. With the higher success rate of fire suppression personnel stands adjacent to the treated are would be at a lower risk. Following treatment a small amount of scorch would occur and kill the lower needles, which would then drop to the ground within 2-3 years. Three to five years after the initial treatment was completed the same area would be burned again, further reducing ground fuels, and mimicking the natural role of fire.

Fire Group 7

There are three different **aspen** treatments prescribed for this Fire Group; the aspen burn, aspen maintenance, and aspen regeneration harvest.

The aspen burn would reduce the potential of an unwanted wildland fire within this treatment area. As the conifer has encroached into this area some of the aspen has died and added to the existing fuel load. As the more shade tolerant species establish and increase in size, fuel loadings would also increase. Because of the changed conditions within this FG, the existing conifers and aspen forests are at an increased susceptibility to fire, especially a forest replacing fire. The physical character of conifer trees, low hanging branching habit, high densities and relative high needle flammability has

also increased the susceptibility to a fire of forest replacing stature. By burning, fuel loads would be reduced, conifer would be removed, and a healthy young green stand of aspen would be established. These aspen stands would remain a FM 8 and not be allowed to convert to a FM 10, section 4.2.9.1, FG 5 discusses the different fire behavior characteristics. Prior to burning the conifer could be cut as needed to establish necessary fuels to carry the fire.

The aspen maintenance treatment would reduce the potential of an unwanted wildland fire within this treatment area. As the conifer has encroached, both fuel loads and stand densities have increased. This vegetation change would result in the FG being moved toward a different FG. By removing the encroaching conifer, a true FG 7 would be maintained. These aspen stands would remain a FM 8 and not be allowed to convert to a FM 10, section 4.2.9.1, FG 5 discusses the different fire behavior characteristics. Pure aspen stands are not considered to be highly combustible. In the short term these stands would be more susceptible to a unwanted wildland fire. By removing the conifer, additional fuels would be placed on the ground increasing the overall fuel loading. The effect of these additional fuels would be mitigated as much as possible by lopping limbs and tops to within 2 feet of the ground. Lopping results in faster fuel decomposition, and reduces the potential flame lengths in the event of a fire. The slash would diminish within 1-3 year period as the needles and twigs dry and separate from the branches. Fuels resulting from this treatment would not be continuous, so fire would not have a continuous fuel source. Overall, there would be a short-term increased fire hazard. In the long term, fire risk would be reduced.

Aspen regeneration harvest would reduce the potential of an unwanted wildland fire within this treatment area. Approximately 23% of this area would be treated. Fires may still occur within this area, however the spread potential would be reduced, suppression personnel would have a higher success rate of stopping the spread of fire. A true FG 7 would be maintained, pure aspen stands are not considered to be highly combustible. In the short term, however these stands would be more susceptible to unwanted wildland fire. With this treatment additional fuels would be placed on the ground increasing the overall fuel loading. The effect of these additional fuels would be mitigated as much as possible by lopping limbs and tops to within 2 feet of the ground. Lopping results in faster fuel decomposition, and reduces the potential flame lengths in the event of a fire. The slash would diminish within 1-3 year period as the leafs and twigs dry and separate from the branches. The skid trails which would be utilized to remove the aspen would act as fuel breaks in the event of a fire. Fuels resulting from this treatment would not be continuous, so fire would not have a continuous fuel source. Overall, there would be a short-term increased fire hazard. In the long term, the risk to fire would be reduced.

Fire Group 10

No treatment is planned for this FG under the Proposed Action. The effects described for this fire group under the No Action alternative apply to this alternative.

Forest Plan Consistency

Under the Proposed Action Alternative, there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. The Desired Conditions and Need for Change listed within the LRMP, for both fuels management and prescribed fire would be moved toward. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would also be met.

4.2.9.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON FIRE

All Fire Groups

Within the Cumulative effects area (ESFMZ) past activities along with fire suppression policies has led to conditions prone to large scale wildfires of catastrophic proportions (Federal Wildland Fire Management Policy & Program Review, 1995). Large wildfires are very difficult, dangerous, and costly to suppress. The risk of wildfire is particularly important in terms of fires which may occur on the National Forest lands and have the potential to burn onto private lands. Implementation of the Proposed Action would reintroduce fire to (11,650 - 12,300) acres of land, and treat an additional 1,302 acres of fuels. The additional vegetation treatments would also reduce potential fire spread. All treatments would reduce the threat and risk of a large scale wildfire. This treatment would increase future opportunities of allowing naturally ignited fires to burn under specified conditions. Within the LBS analysis area an additional 416 acres would be treated utilizing prescribed fire, thus reducing additional fuel load levels. Any other treatments would also reduce the threat of a large scale wildfire. In general the number of acres, and the intensity at which these would burn would be reduced. Within the sagebrush and pinyon/juniper the intensity at which fires would burn would be reduced, but the size of these fires may increased, due to available ground fuels (grass/forbs).

4.2.10 EFFECTS OF PROPOSED ACTION ON HERITAGE RESOURCES

Proposed activities would not impact known historic properties. Therefore, there will be no effects.

4.2.11 EFFECTS OF PROPOSED ACTION ON SOCIO/ECONOMICS

4.2.11.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON SOCIO/ECONOMICS

Implementation of this alternative would result in the removal of approximately 200 MBF of conifer sawtimber and 1,126 MBF of aspen. Total stumpage value to the Forest Service is estimated at $52,886.24. The design of these treatments would favor Stoltze Aspen Mill in Sigurd, Utah who may or may not subcontract the logging with local (Garfield and Wayne County) loggers. The conifer volume which is incidental to the aspen treatments would most likely be processed by local saw-mills.

The design of the various burning and mechanical treatment projects would improve game habitat, particularly in terms of turkey, deer and elk, thereby potentially increasing the recreational hunting opportunities over the long term as measured by the total acres of treatment, 12,952-13,602 acres. Treatments in the pinyon-juniper and sagebrush may reduce deer feeding in the Salt Gulch and Boulder ranches and thereby reduce deer depredation permits. Overall, the various fuel treatments would reduce the risk to catastrophic fire and their suppression costs.

Economics

The costs of implementing this alternative are as follows:

NFMA/NEPA planning	$66,500.00
Sale administration	$21,876.33
Sale Preparation	$51,479.91
Survival/Stocking Exams	$1,978.10
Road Closure Gates	$ 5,550.00
Sagebrush Burning	$5,625.00
Pinyon-Juniper burn	$100,750.00
Oak burn	$18,050.00
Ponderosa pine burn	$630,000.00
Mixed Conifer burn	$29,250.00
Aspen burn	$21,700.00
Total Costs	$952,759.34

The benefits would include money generated from the timber sale receipts which is estimated at $52,886.24 with the removal of 1,326 MBF of forest product. Benefit cost ratio is .54. Based on the 1997 TSPIRS report for the Dixie National Forest, the timber sale would provide 21 jobs, produce $1,051,246.08 in local income, and produce $157,649.77 in federal income tax revenue.

4.2.11.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON SOCIO/ECONOMICS

The scope of the cumulative effects analysis includes the Garfield and Wayne Counties's local economies. The release of 200 MBF of conifer and 1,126.46 MBF of aspen forest products could provide short term security to small operators. Of greater importance is the supply of aspen logs to the developing aspen industry in Sigurd, Utah which recently has been purchasing aspen off of the Dixie National Forest.

4.2.12 EFFECTS OF PROPOSED ACTION ON AIR QUALITY

4.2.12.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON AIR QUALITY

Parameters

There are five parameters that are important to the determination of air quality and its potential effects. These include the amount of airborne particulates, gaseous pollutants, visibility, the Prevention of Significant Deterioration (PSD) designation, and proximity to residential private subdivisions or Class I airsheds.

Existing Airborne Particulates

The concentrations of Total Suspended Particulates (TSP) and particulate matter less than ten micrometers (PM-10), are monitored by the State of Utah, Department of Environmental Quality, Division of Air Quality (UDAQ).

The analysis area is located in Garfield County which is classified as an Attainment Area (this means an area considered to have air quality as good as, or better than, the National Ambient Air Quality

Standards (NAAQS) as defined in the Clean Air Act). Of the 29 counties located in the State of Utah, Garfield County has the seventh lowest concentrations of PM-10 (Utah Division of Air Quality, 1993). Primary emission sources that would contribute to particulate levels would be motor vehicle/motorized equipment exhaust, emissions from recreational campfires, dust, prescribed fire, and wildfire within or adjacent to the project area.

Fire Group 0

Prescribed burning would occur on 200-250 acres. Based on 225 acres being burned with 3 tons per acre being consumed and an emission factor of 25 lbs. per ton, 8.4 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented: when all state laws, and regulation could be met, when present and foreseeable future burning conditions allows the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc. (refer to Chapter 2, Section 2.4). Particulate emissions from the burn would not be substantial. The majority of emissions would be produced within the first 3 hours of ignition, and would then dramatically decrease. Implementation of the burn could take 1-2 years to complete. Smoke management guidelines would be based on the Prescribed Fire Smoke Management Guide 420-2 (SMG), a publication of the National Wildfire Coordinating Group, and the Utah Smoke Management Plan to assure that burning occurs only during days with favorable dispersion factors.

Fire Group 1

Prescribed burning would occur on 3,000-3,500 acres. Based on 3,250 acres being burned with 4 tons per acre being consumed and an emission factor of 40 lbs. per ton, 260 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc. (refer to Chapter 2, Section 2.4). Particulate emissions from the burn would not be substantial. The majority of emissions would be produced within the first 6 hours of ignition, and would then dramatically decrease. A small amount of residual smoke would be evident following each initial ignition for up to 3 days. Implementation of the burn could take up to five years to complete. Smoke management guidelines would be based on the Prescribed Fire Smoke Management Guide 420-2 (SMG), a publication of the National Wildfire Coordinating Group, and the Utah Smoke management Plan to assure that burning occurs only during days with favorable dispersion factors.

Fire Group 2

Prescribed burning would occur on between 450-500 acres. Based on 475 acres being burned with 6 tons per acre being consumed and an emission factor of 25 lbs. per ton, 35.6 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial, the majority of the emissions would be produced within the first 6 hours of ignition in each unit, and would then dramatically decrease. It is estimated that a small amount of residual smoke would be evident for 2 days following the initial ignition of each unit. Implementation of the burn could take up to five years to complete. The Utah

Smoke Management Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Fire Group 3

Approximately 7,000 acres of prescribed underburning would take place in this fire group. Based on 7,000 acres being burned with 6 tons per acre being consumed and an emission factor of 50 lbs. per ton, 840 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial as most of the emissions would be produced within the first 6 hours of ignition each day, and would then dramatically decrease each day. It is estimated that a small amount of residual smoke emissions would be evident for up to 3-6 days following each day of ignition. Implementation of the burn could take up to five years to complete, and would be repeated starting in 3-5 years. The Utah Smoke Manage Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Fire Group 5

Approximately 300-350 acres of prescribed underburning would take place in this fire group. Based on 325 acres being burned with 5 tons per acre being consumed and an emission factor of 50 lbs. per ton, 40.6 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial as most of the emissions would be produced within the first 6 hours of ignition each day, and would then dramatically decrease each day. It is estimated that a small amount of residual smoke emissions would be evident for up to 3-5 days following each day of ignition. Implementation of the burn could take up to three years to complete, and could then possibly be repeated starting in 3-5 years. The Utah Smoke Management Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Fire Group 7

Based on 700 acres being burned with 5 tons per acre being consumed and an emission factor of 25 lbs. per ton, 43.8 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Approximately 700 acres of prescribed underburning would take place in this fire group. Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial as most of the emissions would be produced within the first 6 hours of ignition each day, and would then dramatically decrease each day. It is estimated that a small amount of residual smoke emissions would be evident for up to 3-5 days following each day of ignition. Implementation of the burn could take up to three years to complete. The Utah Smoke Management Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Within the 1,000 acres of aspen maintenance no burning would take place. However there would be a small increase in the amount of carbon monoxide and fugitive dust produced, as a result from tree cutting. This increase would be short term, and only take place while the conifer is being removed.

Within the 302 acres of aspen regeneration harvest no burning would take place. Through tree harvest there would be slight increase in the amount of carbon monoxide and fugitive dust. This increase would be short term, and only take place while the trees are being removed.

Fire Group 10

Within this fire group no action is to take place. This FG would be at less risk from an unwanted wildland fire entering from another FG. Therefore its less likely that air quality standards would be violated in the event of a fire.

Emission Production and Duration

Burning within the different fire groups would not take place at the same time, and would require five years to accomplish all of the projects initially. The production of emissions would be spread out overtime, therefore any impacts would be below the thresholds set in the Clean Air Act.

Gaseous Pollutants

The only gaseous pollutants expected to be increased in the short term would be carbon monoxide. Carbon monoxide would be produced only briefly during periods of burning. Within the project area, logging equipment would also emit a small amount of carbon monoxide during logging operations. Impacts would be below thresholds set in the Clean Air Act.

Visibility

There would be an increase of TSP associated with both burning and harvesting. These affects would be spread out over a five year period, and would not have a substantial effect on visibility. The EPA in conjunction with the IMPROVE network would continue to monitor visual quality trends.

Prevention of Significant Deterioration (PSD)

The Forest Service would comply with all state laws and guidelines listed within the Utah Smoke Management Plan.

Proximity to Private Subdivisions or Class I Airsheds

Smoke would be evident within the Proximity to private subdivisions and Class I airsheds. These airsheds would be impacted. However, the impact is anticipated to be minor and of short duration. A computer program entitled Simple Approach Smoke Estimation Model (SASEM) would be used to assure the threshold standards set within the Clean Air Act would not be exceeded for gaseous pollutants or emissions within these areas (SASEM outputs can be found in the project file).
The prevailing winds would generally take the smoke to the northeast of the analysis area with Capitol Reef seeing the biggest impact. However, the smoke should dissipate prior to reaching the park with the impact minimal and of short duration. Smoke management plans and computer modelling would be utilized, and followed during any burning activities to minimize impacts. The Forest

Service would comply with all state laws and guidelines listed within the Utah Smoke Management Plan. This would reduce any substantial impacts on air quality to the areas of concern.

Forest Plan Consistency

Under the Proposed Action there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. Desired Conditions and Need for Change listed within the LRMP, for fuels management, air quality, and prescribed fire would be met. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would be met.

4.2.12.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON AIR QUALITY

The cumulative effect area (CEA) for air quality includes a large portion of Southern Utah, encompassing the Escalante and Teasdale Ranger Districts, the Grand Staircase Escalante National Monument, Bryce Canyon and Capitol Reef National Parks, both Garfield and Wayne counties. The effects of past prescribed fire and wildfire are unknown. Short term pollution (TSP and PM-10) exceeding primary standards has likely occurred from past large unwanted wildland fires occurring in Southern Utah and Northern Arizona. Visibility has been affected in Southern Utah as well as adjacent states. Future wildfire frequency is expected to continue as it has been observed in the past. No measurable adverse affects from past conifer removal, or timber harvest activities are known. Future harvests are expected to have similar effects as described in the proposed action. Gaseous pollutants (carbon monoxide) have occurred and would continue on an increasing basis with increased motorized activity (associated with recreation, home building and general transportation needs). Under the this alternative 1,228.4 tons of particulate matter associated with prescribed burning activities would be produced over the next five years. Smoke from prescribed burning would be short term, with a minimal increase in carbon monoxide, TSP, and PM-10. Smoke should dissipate quickly after each individual ignition. No measurable cumulative long term effects would occur within the cumulative effects area, or areas of concern (see SASEM outputs, project file). The use of prescribed fire by other agencies or private individuals at the same time would have a cumulative effect, and would need to be coordinated to assure that procedures established in the Utah Smoke Management Plan are followed. No measurable cumulative effect would occur from implementation of the proposed action and LRMP guidelines would be met.

4.2.13 EFFECTS OF PROPOSED ACTION ON LIVESTOCK GRAZING

4.2.13.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON LIVESTOCK GRAZING

The greatest potential effect from the Proposed Action would develop from the regeneration treatments within the aspen stands, both fire and harvest methods. These areas treated would attract livestock especially when adjacent to key areas. If construction of a fence is necessary to protect aspen regeneration in the burn unit above Haws Pasture, then approximately 500-600 acres would be lost temporarily (3-5 years) from transitory grazing. However, if the project is implemented in a 1-2 year period, the extent of the treatments will diffuse grazing intensities to the extent that a fence should not be necessary. Treatments in the sagebrush, PJ, and oak could also attract heavier grazing, but would be regulated by the standard and guidelines of the term grazing permit. Some areas, such as Pretty Tree Bench are not grazed, and should not receive additional grazing pressure. Treatments in the ponderosa pine and mixed conifer should not effect grazing activity.

Livestock will benefit over the long term from these treatments from the increase in forage quantity and quality by the total acres of treatment, 12,952-13,602 acres. Maintenance for aspen stands versus conifer conversion will result in higher forage production. Studies have shown that within aspen stands (Harniss, 1982), increases of 20 basal area/acre of conifer trees can reduce understory production by more than half. Furthermore, conifer conversion will reduce water yields, and reduce plant diversity. Therefore livestock will benefit from the 1,002 acres of aspen regeneration and 1,000 acres of aspen maintenance. These treatments occur on transitory range and will not lead to changes in livestock numbers.

4.2.13.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON LIVESTOCK GRAZING

In addition to the cumulative effects described in the Sand Creek Soil Stabilization Project (EA, chapter 4, pages 101-102), and LBS Vegetation Treatment Project (EA, Chapter 4, pages 68-69) there would be an increase in quantity and quality of forage commensurate with the total acres of treatment, 12,952-13,602. However, there would not be any increases in cattle numbers associated with this project.

4.2.13.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

The Proposed Action would cause no adverse effects nor any irreversible/ irretrievable commitments in relation to Livestock Grazing.

4.2.14 EFFECTS OF PROPOSED ACTION ON SPECIAL USES AND ON MINERALS

4.2.14.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON SPECIAL USES AND ON MINERALS

This alternative would have no immediate effects on current permitted uses or mineral leases. This alternative would reduce the potential for a large-scale fire in the area, which could result in sedimentation damage to the irrigation ditch and discourage use of the area by outfitter-guide permittees.

4.2.14.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON SPECIAL USES AND ON MINERALS

This alternative would not promote or preclude the current or potential future uses and mineral developments within this area of influence. This alternative would address the potential for a future large-scale wildfire. Reducing such potential would also reduce the potential for adverse effects to the current uses in the form of excessive sedimentation in the irrigation ditch and discouragement of services by the outfitter-guide permittees.

4.2.15 EFFECTS OF PROPOSED ACTION ON TRAVEL MANAGEMENT

4.2.15.1 DIRECT AND INDIRECT EFFECTS OF PROPOSED ACTION ON TRAVEL MANAGEMENT

The effects of implementing the Proposed Action on travel management would be a result of the amount of road reconstruction, the amount of roads remaining open to motorized travel and the

amount of roads on which the type of use is being altered. The direct and indirect effects of the management activities are disclosed in the proceeding resource sections.

The Proposed Action would implement a "Closed Unless Posted Open" travel management philosophy, meaning that unless a road or area is specifically posted as open it would be closed to travel by motorized vehicles. This would result in 52.9 miles of road remaining open to motorized travel. Roads within the Sand Creek and Sweetwater drainages would be seasonally closed from August 20 to June 1 of each year. An OHV Loop with a staging area at the Dry Lake Trailhead and using existing roads would be created. This loop would consist of forest roads 514, 166, 887 and that portion of the GWT between the Dry Lake Trailhead and the head of Bear Creek (forest road 473).

Appendix 3, Map H graphically depicts the roads which would remain open, those which would be seasonally closed and the OHV Loop.

Travel by over the snow machines is limited by land use designations (ie. wilderness and Big Game Winter Range) and snow accumulations. Approximately xxx acres within the project area would be open to travel by snow machines.

The Proposed Action is consistent with the direction provided in the Land and Resource Management Plan for the Dixie National Forest Implementation of the Proposed Action would move the analysis area towards the Desired Future Condition as described in Chapter 1.

Road Density

The open road density within the analysis area would be 1.00 miles per square mile.

4.2.15.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON TRAVEL MANAGEMENT

Travel management activities directly and indirectly effect the other resources within the analysis area.

Effects of sedimentation due to road reconstruction, road closures, or changes in use are discussed in the proceeding resource sections of this document.

4.2.15.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ

With the Proposed Action there would be no irretrievable or irreversible commitment of resources.

The area and road closures decisions are not irretrievable and can be reversed. The creation of the OHV Loop could also be reversed by reclaiming the trail location and rehabbing the location to its original condition.

4.3. ALTERNATIVE 1

4.3.1 EFFECTS OF ALTERNATIVE 1 ON VEGETATION

4.3.1.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON VEGETATION

Forest Ecosystems

Ecosystems

Approximately 200-250 acres of existing **sagebrush** stands would be treated with stand replacement prescribed fire followed with seeding where current seed source is inadequate. This action would create patches of grass/forbs with little if any sagebrush and conifer trees. It is expected that within 2-3 years sagebrush regeneration would initiate. Overall, this action would create a better balance of age classes more representative of historic fire frequencies and patterns (Draft Properly Functioning Condition - Process-- 12/23/96, pages 28, 14-15, 17-19, Draft PFC for Major Vegetation Types, pages 4, 16-17, 19-22).

Within the **PJ** zone 3,000-3,500 acres, would be treated with a combination of cutting and prescribed fire to create more open or savannah like stand conditions with grass/forbs/shrubs established in the interspaces. This treatment would occur in areas conducive to fire, such as high density stands adjacent to sagebrush flats, as opposed to open stands on rocky hillsides. This action would result in greater representation of a seral stage of stand development characteristic of the natural or historic periodic fire regime. In some cases the stands would revert back to early grasses. Studies indicate (Gottfried, 1996) in Utah, juniper will be the first tree species to invade with tree dominance occurring in 70 to 80 years. In other cases fire will create open savannah like stands with greater concentrations of ground vegetation in openings. Areas treated with fire which are lacking in grass/forbs seed sources or are subject to erosion will be seeded. Restoration of PJ sites to restore ground vegetation require a combination of tree thinning and application of grass seed (Chong, 1994). Elimination of livestock grazing will not restore areas (Chong, 1994, Bunting, 1986). Approximately 780 acres of this treatment would entail felling conifer trees which are overtopping brush, such as oak. The overall effect of this treatment will be greater diversity of stand densities, age classes, and increased understory vegetation. Conditions will also more closely mimic those within the historic ranges (Draft Properly Functioning Condition - Process-- 12/23/96, pages 23, 10-11, 13-14, Draft PFC for Major Vegetation Types, pages 4, 12-13, 19-22).

Burning of 450-500 acres of **oak** brush, would rejuvenate the oak clones into a younger, seral stage of young oak sprouts (Clary and Tiedemann, 1993). Conifer trees found within the oak would be killed by burning, thus creating snags. This action would provide greater diversity of stages of oak stand development more characteristic of historic fire disturbances (Draft Properly Functioning Condition - Process-- 12/23/96, pages 25, 12-13, 15-16, Draft PFC for Major Vegetation Types, pages 4 and 15, 19-22).

A cool surface fire treatment would be prescribed on approximately 7,000 acres of **ponderosa pine** stands. This action is designed to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir (Covington and Moore, 1995). Mortality to some live ponderosa pine trees would increase snag densities and provide areas suitable for pine regeneration. Generally this action will move stand conditions more closely associated with the historically frequent fire regime (Sackett, 1990) and reduce the risk to catastrophic fire (Draft

Properly Functioning Condition - Process-- 12/23/96, pages 22, 9-10, 12-13, Draft PFC for Major Vegetation Types, pages 4, 10-12, 19-22).

Aspen would experience two different treatments; 1,000 acres of removal of understory conifer trees and 1,000 of aspen regeneration using stand replacement fire. The removal of understory conifer trees is designed to provide more areas in which aspen will dominate now and in the near future (Harniss, 1982, Alder, 1970), prior to regeneration. The conifer trees are small enough to limit damage during tree removal to the residual aspen trees. The regeneration treatments would be designed to kill the existing conifer and aspen trees, thereby stimulating the aspen sprouting (Schier, 1975, Debyle and Winokur, pg 197-198, Brown, 1985) and eliminating conifers. Aspen sprouting would occur within 1-3 years. Initial suckering rates can be as high as 10,000-30,000 tree per acre with 65% mortality within ten years (Hittenrauch, 1984). The intensity of the treatments in terms of tree removal/mortality was based on suckering rates increasing with degree of tree removal, clearcutting being optimum (Hittenrauch, 1984, Frykman, Jacobi, 1990). The 1000 acres of aspen regeneration will create a better balance of age and structural class diversity of aspen and reduce the succession to conifers across the project area. The long term effect of the treatment would be to establish young healthy seral aspen clones. These stands would have minimal conifer composition and serve in the future as replacement old growth/dominant aspen. Use of fire will mimic the historical disturbance effect of fire behavior. Overall these treatments will create conditions closer to those found within the historical range, patterns, and structural stages (Draft Properly Functioning Condition - Process-- 12/23/96, pages 17, 3-4, 9-10, Draft PFC for Major Vegetation Types, pages 4, 7-9, 19-22).

The **mixed conifer** zone would have 300-350 acres of cool surface fire prescribed. The intent of this treatment is similar to that proposed in the ponderosa pine in which fire would be used to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir. Mortality to some live ponderosa pine/Douglas-fir trees would increase snag densities and provide areas suitable for pine/Douglas-fir regeneration. Generally this action will move stand conditions more closely associated with the historic frequent fire regime and reduce the risk to catastrophic fire (Draft Properly Functioning Condition - Process-- 12/23/96, pages 19-205-7, 10-12, Draft PFC for Major Vegetation Types, pages 4, 9-10, 19-22).

Ecosystem Health

The use of harvest and burning methods in the sagebrush PJ, oak, ponderosa pine, aspen and mixed conifer would mimic disturbances associated with the historic fire regime. Sagebrush ecosystems would be restored to a greater balance of age classes, canopy density, and range increased to more historical levels. The effect would be creation of stand fuel conditions within the ponderosa pine and mixed conifers more closely associated with a frequent fire regime while increasing snag distribution in the previously harvested stands. Decadent aspen stands would be rejuvenated. Seral, conifer free stands of oak would be created. This would have the net effect of increasing the health of the ecosystem for both the short and long term by the overall acres treated, 12,950-13,600.

Stand Health

The effect of stand replacement fire in 200-250 acres of sagebrush will be to create a more diverse ecosystem of age structure diversity which improves the overall health of the sagebrush stands.

Within the treated 3000-3500 acres of PJ, stand health would be improved in the short term by substantially decreasing stand densities. Over the long term, creation of a younger stand of PJ and a more heterogenous landscape would reduce the potential for insect activity versus a mature stand. In

addition, creation of a mosaic of stand conditions, reduces the potential for a landscape level disturbance and will create stand conditions conducive to more frequent fire.

Treatment in the oak would rejuvenate the existing oak, eliminating conifer encroachment, and creating a younger and healthier stand of oak. Over the long term, these stands would provide longer term stability than the untreated clones.

7000 acres of prescribed fire within the ponderosa pine and 300-350 acres within the mixed conifer would have the benefit of releasing nutrients currently held in the leaf litter to surrounding trees. Reducing both the ground and ladder fuels would provide greater security against stand replacement fire throughout the conifer belt. Some tree mortality, generally less than 5%, would be expected to accomplish the burning.

The aspen treatments would rejuvenate the diseased, mature stands of aspen, thus creating younger, disease free clones. These clones would be more capable of surviving over the long term.

These treatments would have the net effect of increasing the health of the stands for both the short and long term by the overall acres treated, 12,950-13,600.

Productivity

The short term effect of surface fire within the ponderosa pine and mixed conifer will be the availability of nutrients released by the burning versus the loss of trees caused by extreme fire behavior (Covington and Moore, 1994). Expected tree mortality will create understocked openings and loss of stand productivity. The long term effect will be, more resilient conifer ecosystems to catastrophic losses from stand replacement fire.

Within the aspen zone, removal of the existing trees would reduce current site utilization. It is estimated that it will require approximately 15 - 20 years for these stands to return to existing site utilization levels. Once this occurs, productivity would increase as a young healthy, fully stocked stand of aspen grows towards maturity.

Overall, there will be some losses to stand productivity over the short term by the 7,602-7,652 acres of treatment. However, long term stand productivity would be improved by those same treated acres with the reduction of risk to stand level mortality and understocking.

Vegetative Structural Stage Distribution

Within the Side Hollow Nest Area, there would be 18 acres of aspen maintenance in which understory conifers would be removed non-commercially, and 93 acres of underburning in the ponderosa pine. Both of these treatments are acceptable methods for managing nest area vegetation and will move the area towards a more desirable condition (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 21-22) by removing undesirable understory trees with non-uniform spacing using hand tools. Also within the PFA, 223 acres of ponderosa pine burning are proposed. This action also utilizes acceptable methods and effects by increasing snags, reducing hazardous fuels and recycling nutrients, and encourage aspen and oak regeneration (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 22-26).

For the Sand Creek home range, the nest area would have 30 acres of aspen maintenance and 134 acres of ponderosa pine. Within the PFA, there would be 557 acres of ponderosa pine underburning. Effects would be similar to those described under the Side Hollow home range.

No Treatments are planned in the McGath Lake nest area. Within the PFA, up to 38 acres of aspen would be treated with fire, thereby regenerating approximately 20% of the aspen stands.

Within the foraging areas the following would occur; 952 acres of aspen maintenance, 962 acres of aspen regeneration burning, 5,993 acres of ponderosa pine underburning, and 300-350 acres of mixed conifer underburning. Although specific aspen management for the northern goshawk have not been developed, applying the general habitat principles would provide suitable habitat. For aspen, management would create a variety of VSS classes through the regeneration methods, provide more stable aspen through understory removals, increase snags via burning, and recycle nutrients (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 26-30). The "Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah (1998) provides for use of local assessments in designing treatments in aspen habitat. The planned aspen regeneration patterns fall within the historic range of variation to mimic natural disturbance patterns.

Initially, aspen regeneration areas may be too large an opening for suitable goshawk habitat, but once stocking is fulfilled and suitable for goshawk use (approximately 15 years), the treated areas will return to suitable habitat. Mosaic burn patterns may also retain sufficient cover to maintain habitat. These treatments would provide long term sustainability of aspen, considered desirable for certain goshawk prey.

Forest Land Suitability

Under this alternative harvest would not take place, therefore there would be no effect.

Old Growth

Treatments in the pinyon/juniper and aspen would have an effect on existing and future old growth. The initial effect on the PJ stands, would be loss of up to 904 acres of existing old growth, reducing existing habitat to 5,418 acres or 36 percent of the PJ vegetation. However, the prescribed burning may retain sufficient large old trees or due to the mosaic burn patterns leaving sufficient areas unburned that little if any old growth habitat would be lost. The benefit of this treatment approach is to create a more heterogenous landscape which is less susceptible to catastrophic stand replacement fire, including the loss of existing old growth. In the long term (250-300 yrs), these stands may serve as replacement old growth stands and ensure a more continued presence of old growth habitat over time.

Approximately 512 acres of existing ponderosa pine old growth would be treated with low intensity surface fire to reduce ground and ladder fuels, as well as replicating the natural role of fire. This treatment has been recommended (Covington and Sackett, 1986, 1990, Covington and Moore 1994 and 1994, Kolb et al, 1994) to enhance stand conditions favorable to old growth.

Some mortality may occur but would not be at levels which would eliminate a stand from qualifying as old growth. Past experience with underburning in ponderosa pine in areas such as Stump Springs demonstrates less than 5% tree mortality favoring trees in the low to middle size classes. Creation of snags would improve the quality of the old growth.

There will not be mixed conifer old growth proposed for underburning. These stands are in remote locations and in need of mechanical treatment to reduce stocking levels prior to prescribed fire initiation. These stands would benefit from reduction in risk to catastrophic fire throughout the project area, thereby increasing the ability to suppress fires into the old growth.

Scheduled aspen regeneration treatments would reduce existing old growth by 254 acres to 1,155, or 34% of the aspen within the project area. The long term effect would be that these regenerated stands could provide future old growth in 100 years thereby ensuring future stability of the aspen type.

In the short term, existing old growth habitat could be reduced by up to 1,158 acres, reducing the total to 7,220 acres. Old Growth would be reduced to 21% of the project area, or 26% of the forested acres. The long term effect would result in greater stability of old growth through reduced risk to catastrophic losses, and the ability to sustain old growth over time.

Forest Plan Consistency

Under this alternative, all proposed treatments are consistent with the Land and Resource Management Plan for the Dixie National Forest. These treatments are designed to move the analysis area towards the Desired Future Condition as described in Chapter I.

4.3.1.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON VEGETATION

Forest Ecosystems

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek subwatersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). More recent analysis, (LBS Vegetation Treatment Project), have emphasized developing vegetation diversity, stand composition, structural stages, and using uneven-aged management.

The greatest potential change in effects would be if a large stand destroying event such as fire spread throughout the area. Implementation of Alternative 1 would reduce the risk of catastrophic fire to the sub-watersheds by reducing accumulated ground and ladder fuels and develop greater stand structure and composition diversity. These changes are especially important to the cumulative effects areas since this area is also very similar to the project area, being very homogenous and susceptible to more intense fire than the normal historic range. These treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,950-13,600.

Ecosystem Health

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek subwatersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with shorter rotations (120 yrs). More recent analysis, (LBS Vegetation Treatment Project), have emphasized developing vegetation diversity, stand composition, structural stages, and using uneven-aged management.

Implementation of Alternative 1 would improve the ecosystem health at this scale given the extent of proposed treatments which will reduce stand densities, decrease shade tolerant species, reduce forest floor fuel accumulations, and maintain certain key ecosystems (oak, seral species dominated by

mixed conifer, and aspen) . These changes would result in increasing the diversity of the sub-watershed and decrease the destructive potential of wildfire eliminating the forest cover at the landscape level. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,950-13,600.

Stand Health

The area of analysis for the cumulative effects would be the Sand Creek and Bear Creek sub-watershed. As the potential for insect/disease activity increases, the risk to adjacent stands increases. Stands with highest density levels and/or age classes could provide a source for infection or infestation into surrounding areas. An example would be dwarf mistletoe infection centers could provide sufficient beetle susceptible trees to build-up populations which then fly into adjacent stands. An additional threat is these mortality centers providing snags/fuel for wildfire which carries into surrounding stands (Knight, 1987). Implementation of the proposed treatments would create greater diversity of stand densities, structure and composition closer to the historic ranges. Greater stability within these ecosystems would decrease levels of insects and diseases at both the project and sub-watershed scales. Therefore these treatments would have the net effect of improving the cumulative effects area by the overall acres treated, 12,950-13,600.

Productivity

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). More recent analysis, (LBS Vegetation Treatment Project), have emphasized developing stand and tree growth, seral species, and use of uneven-aged management.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area resulting in widespread mortality and hence under utilized productivity. Implementation of the proposed treatments would reduce the risk of such mortality both within the project and sub-watershed scales. Productivity would be shifted to seral species, which are more capable of attaining the larger sizes (ponderosa pine and Douglas-fir). Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,952-13,602.

Vegetative Structural Stage Distribution

The area of influence for the cumulative effects analysis is the project area divided into the various goshawk management areas for the three nest areas located within the project area (project file, vegetation). Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands as well as regeneration of aspen, with the intent to develop stands towards northern goshawk habitat (LBS Vegetation Treatment Project, Chapter 4, pages 31-32) . These activities were designed to improve existing conditions towards the desired future condition for northern goshawk, by emphasizing a younger age class of seral pioneer species. Implementation of these activities as well as those proposed under this project will lead to further enhancement of vegetation conditions for future goshawk habitat.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area. Implementation of the proposed treatments would reverse this trend by

lowering stand densities, reducing shade tolerant species, introducing fire as a disturbance, and enhancing stand structure and composition diversity. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,950-13,600.

Forest Land Suitability

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests, being planned prior to the LRMP did not identify timber suitability. These timber sales incorporated forestry practices which were designed to maintain soil productivity. Most recent analysis, (LBS Vegetation Treatment Project), have classified and complied with timber suitability requirements. Present and future timber sales will comply with suitability requirements. Therefore, there will not be any effect on land suitability.

Old Growth

The following table summarizes the cumulative effects by drainage, considering the implementation of the Proposed Action as well as LBS Vegetation.

Table 4.3.1 Old Growth by Drainage

Drainage	Total acres	Existing O. Growth ac.	% Existing Old Growth	Predicted Old Growth ac.	Predicted % Old Growth
Big Hollow	3,872	2,258	58	1,560	40
Dry Hollow	735	19	3	19	3
Pretty Tree	1,535	425	28	425	28
Side Hollow	3,038	245	8	215	7
Lake Creek	14,845	4,243	29	3,867	26
Bear Creek	8,030	1,381	17	1,151	14
Upper Sand Creek	14,582	2,678	18	2,678	18
West Fork Boulder	14,917	1,298	9	1,274	8
Middle Boulder Creek	3,393	362	11	362	11
Total	64,947	12,909	20	11,651	18

Implementation of the LBS Vegetation project would reduce old growth habitat within the Lake Creek drainage by 100 acres of pinyon/juniper, resulting in 3,867, acres of old growth or 26%. With the exception of Dry Hollow, each drainage meets or exceeds the forest plan standard for old growth. No treatment activities are planned within the Dry Hollow old growth.

Implementation of the proposed actions would not only provide for maintaining adequate existing old growth habitat, but would provide for a rotation of future old growth through creating different stages of stand development throughout the project area and hence the cumulative effects area, which is very similar to the project area. The risk to catastrophic or stand replacement fire within

the cumulative effects area would be reduced. Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, 12,950-13,600.

4.3.1.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be a loss in vegetation cover associated with the road reconstruction, OHV trail construction, aspen maintenance and prescribed fire treatments. Implementation of prescribed fire treatments would reduce existing old growth in the pinyon/juniper and aspen type by 1,158 acres.

Short Term vs. Long Term Productivity - The Proposed Action includes tree thinning and prescribed fire activities which result in short term (less than 10 years) effects, such as mortality of trees from fire and associated reduction in stocking and cover, as described in this section. The design of these treatments includes maintenance or enhancement of long term productivity. In addition, the silvicultural prescriptions and effects will be monitored (Appendix 1) to assure that standards for long-term productivity are met.

Irreversible/Irretrievable Commitments - Ground disturbance associated with OHV trail development, road reconstruction, and prescribed fire would result in loss of existing vegetation. Road reconstruction, trail construction and maintenance activities would revegetate disturbed soil areas. Revegetation of prescribed fire treatments are designed to utilize as much natural regeneration as possible, with unacceptable areas planned for seeding. Succession of vegetation types (sagebrush to pinyon/juniper), tree species (aspen to conifer), reduction of tree or stand growth, ecosystem diversity and old growth aspen would be reduced by the total acres treated 12,950-13,600, but not eliminated.

These losses would be irretrievable but not irreversible.

4.3.2 EFFECTS OF ALTERNATIVE 1 ON RECREATION

4.3.2.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON RECREATION

The direct and indirect effects of implementing Alternative 1 on the recreation resource would be the same as those described for the Proposed Action.

4.3.2.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON RECREATION

The cumulative effects of implementing Alternative 1 on the recreation resource would be the same as those described for the Proposed Action.

4.3.2.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Implementation of Alternative 1 would not result in any irretrievable or irreversible commitment of the resource. The irreversible or irretrievable commitment of the resource would be similar to those described under the Proposed Action.

4.3.2.4 EFFECTS OF ALTERNATIVE 1 ON WILDERNESS

Direct and Indirect Effects of Alternative 1 on Wilderness

The direct and indirect effects of implementing Alternative 1 on the wilderness are the same as those described for the Proposed Action.

Cumulative Effects of Alternative 1 on Wilderness

The cumulative effects of implementing Alternative 1 on the wilderness are the same as those described for the Proposed Action.

Other Effects Analysis Required by CEQ Regulations

Implementation of Alternative 1 would not result in an irretrievable or irreversible commitment of the wilderness resource. This alternative would be similar in effects as the Proposed Action alternative.

4.3.3 EFFECTS OF ALTERNATIVE 1 ON ROADLESS/UNDEVELOPED RESOURCES

INTRODUCTION

This section describes the effects of Alternative 1 on the roadless/wilderness attributes of natural integrity/apparent naturalness, opportunities for solitude/primitive recreation, special features, and manageability/boundaries. Please refer to Section 4.2.3 for a complete discussion of the analysis methods to be used and to view a table summarizing effects of the various alternatives.

4.3.3.1 EFFECTS OF ALTERNATIVE 1 ON IRAS

DIRECT AND INDIRECT EFFECTS

Boulder Mountain/Boulder Top/Deer Lake IRA (No.07040)

Summary of Development

Alternative 1 would result in no development of the Boulder Mountain/Boulder Top/Deer Lake IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct an aspen burn in 197 acres of the total 243 acres of Boulder Mountain/Boulder Top/Deer Lake IRA falling within the Pretty Tree analysis area. Even though some conifer may be cut to carry the fire, it is anticipated that most of the cut wood would be consumed and that the natural integrity and apparent naturalness of the area would be unaffected in the long term. The treated acres would still meet the definition of undeveloped lands.

Solitude and Primitive Recreation
There would be a short term effect on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. This would affect users only during the activity period. With establishment of an OHV Loop Trail, the sounds associated with a probable increase in OHV traffic would reduce the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The treatment of 197 acres would not have any effect on manageability. The roadless portion of the IRA would remain 111,182 acres.

McGath Lake/Auger Hole IRA (No.070034)

Summary of Development

Alternative 1 would result in no development of the McGath Lake/Auger Hole IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would burn 9 acres of ponderosa pine out of the total 32 acres presently roadless within the analysis area. Since the prescribed fire would replicate a natural process, there would be no effect on the natural integrity and apparent naturalness of the 117 acre portion of the McGath Lake/Auger Hole IRA that falls within the Pretty Tree analysis area.

Solitude and Primitive Recreation
There would be a very short term effect on the ability of users to experience solitude during the actual burn due to the presence of workers. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the probable decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 1 would have no effect on the manageability/boundaries of the McGath Lake/Auger Hole IRA. The roadless portion of the IRA would remain 8,328 acres.

Box-Death Hollow IRA (No.07033)

Summary of Development

Alternative 1 would result in no development of the Box-Death Hollow IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct a burn of 112 acres of pinyon-juniper and 16 acres of sagebrush in the 1,098 roadless acres of the Box-Death Hollow IRA falling within the Pretty Tree analysis area. Even though pinyon and juniper would be cut to carry the fire in both vegetation types, it is expected that most of the felled wood would be consumed. As a result, there would be no long term effects on the natural integrity and apparent naturalness of the treated 128 acres.

Solitude and Primitive Recreation
There would be short term effect on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. This would affect users only during the activity period. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 1 would have no effect on the manageability/boundaries of the Box-Death Hollow IRA. The roadless portion of the IRA would remain 3,177 acres (including the 2,079 acre Antone Bench parcel within the Box-Death Hollow Wilderness Area.

New Home Bench IRA (No.07035)

Summary of Development

Alternative 1 would result in no development of the New Home Bench IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct a burn treatment in 29 acres of ponderosa pine, 60 acres of mixed conifer, 148 acres of oak, 2,241 acres of pinyon-juniper, and 14 acres of sagebrush. The first three burn treatments totaling 237 acres would appear as a natural process to most viewers and

would leave no evidence of human activity. The last two treatments totaling 2,255 acres would require cutting of pinyon-juniper to carry the fire and it is expected that most of the felled wood would be consumed in the procedure. As a result, there would be no long term effect on the natural integrity and apparent naturalness of the total 2,492 acres in the five vegetation types. All of the acres would continue to meet the definition of undeveloped lands.

Solitude and Primitive Recreation
With the cut and burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine, mixed conifer, and oak treatments. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 1 would have no effect on the manageability/boundaries of the New Home Bench IRA. The roadless portion of the IRA would remain at 6,000 acres. However, if acreages from the adjacent Undeveloped/unroaded Areas No. 3 and 4 were ever combined with the IRA, it would then have more manageable boundaries consisting of FR 153, Utah State Highway 12 and Boulder Creek. The expanded IRA would total 11,461 acres.

4.3.3.2 EFFECTS OF ALTERNATIVE 1 ON OTHER UNDEVELOPED/UNROADED AREAS

DIRECT AND INDIRECT EFFECTS

Undeveloped/Unroaded Area No. 1 (1,764 acres)

Summary of Development

Alternative 1 would treat a total of 1,290 acres, 606 of which would result in the development of presently undeveloped/unroaded lands. The 606 acres would no longer meet the definition of undeveloped lands and would have to be deleted from the Area. Congress would still have the opportunity to consider the 524 acres of treated lands remaining undeveloped as well as the 259 acres of untreated lands for inclusion into the National Wilderness Preservation System. This is because the 783 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. In these acres, present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected mainly by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct burn treatments in 160 acres of ponderosa pine and in 524 acres of aspen. The ponderosa burn treatment would appear as a natural process to most viewers and would

leave no evidence of human activity. While the aspen burn may require the cutting of conifers to carry the fire, it is expected that most of the felled wood would be consumed. Neither of these activities would have any long term effects on natural integrity and apparent naturalness.
Alternative 1 would also implement 606 acres of aspen maintenance treatment. In the maintenance operation, understory conifers would be cut, leaving stumps and felled tree trunks and limbs. Without prescribed fire to consume any of the felled trees, the wood would be dependent upon wood gathering and ecological processes to decay and become more natural in appearance. The natural integrity and apparent naturalness of the area would be reduced for a number of years.

Solitude and Primitive Recreation
With the cutting and cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine burn only operation would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine treatment. With establishment of an OHV Loop Trail, the sounds associated with a probable increase in OHV traffic would reduce the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
With the development of 606 acres, the approximately 783 remaining acres of undeveloped lands could be combined with the Boulder Mountain/Boulder Top/Deer Lake IRA and other undeveloped/unroaded lands to the northwest. If this were to happen, the manageability of the IRA would remain unaffected.

Undeveloped/Unroaded Area No. 2 (2,868 acres)

Summary of Development

Alternative 1 would result in no development of the Undeveloped/Unroaded Area No. 2 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,868 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct burn treatments in 59 acres of ponderosa pine, in 175 acres of oak, in 80 acres of pinyon-juniper, and in 93 acres of sagebrush. The ponderosa pine and oak burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon-juniper to carry the fire, it is expected that most of the felled wood would be consumed. None of these activities would have any long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine and oak burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine and oak treatments. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 2,868 acres of Undeveloped/Unroaded Area No. 2 would offer the possibility of being combined with the Box-Death Hollow Wilderness Area at some future date. If this were to happen, the wilderness area would gain a more generally identifiable boundary with FR 153 along its northeast border. However, a 152 acre island of private land would detract from the effectiveness of this proposition.

Undeveloped/Unroaded Area No. 3 (3,371 acres)

Summary of Development

Alternative 1 would result in no development of the Undeveloped/Unroaded Area No. 3 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 3,371 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct burn treatments in 26 acres of ponderosa pine, in 323 acres of pinyon-juniper, and in 33 acres of sagebrush. The ponderosa burn treatment would appear as a natural process to most viewers and would leave no evidence of human activity. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon-juniper to carry the fire, it is expected that most of the felled wood would be consumed. None of these activities would have long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine burn only operation would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine treatment. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 3,371 acre Undeveloped/Unroaded Area No. 3 would offer the possibility of being combined with the 6,000 acre New Home Bench IRA and the 2,090 acre Undeveloped/Unroaded Area No. 4 . If this were to happen, the 11,461 acre IRA would gain a more easily identifiable boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

Undeveloped/Unroaded Area No. 4 (2,090 acres)

Summary of Development

Alternative 1 would result in no development of the Undeveloped/Unroaded Area No. 4 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,090 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 1 would conduct burn treatments in 224 acres of pinyon-juniper, and in 33 acres of sagebrush. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon-juniper to carry the fire, it is expected that most of the felled wood would be consumed. These activities would not have long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The period of interruption in any of the above treatments would be of short duration. With establishment of a OHV Loop Trail in the northern part of the analysis area, the opportunity to experience solitude would likely increase due to the decrease in sounds associated with less OHV traffic in this area.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 2,090 acre Undeveloped/Unroaded Area No. 4 would offer the opportunity of being combined with the 6,000 acre New Home Bench IRA and the 3,371 acre Undeveloped/Unroaded Area No. 3 . If this were to happen, the 11,461 acre IRA would gain a more easily identified boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

4.3.3.3 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON ROADLESS/UNDEVELOPED

Introduction

Cumulative effects will be divided into two sections: 1) Effects on IRAs and 2) Effects on undeveloped/unroaded lands.

Effects on IRAs

With implementation of Alternative 1, no acres would be developed in the four IRAs represented in the analysis area. The combined 133,192 roadless acres in those four IRAs and total of 305,806 roadless acres encompassed in the thirteen (13) IRAs in the CEA would remain as at present. The anticipated Donkey/Park Ridge Vegetation Project on the Teasdale District is a foreseeable future action that may develop several hundreds of acres of the Boulder Mountain/Boulder Top/Deer Lake IRA. Both the Final Roads Rule and the President's recent Roadless Initiative are foreseeable future actions that may affect the number of acres of roadless in the CEA. Based on known information, if Alternative 1 were to be implemented, and approximately 750 acres were developed with the Donkey/Park Ridge Project more than 99.5% of the roadless IRA lands within the CEA would remain undeveloped.

Effects on Undeveloped/Unroaded Lands

With implementation of Alternative 1, a total of 606 acres would be developed in the four Undeveloped/Unroaded Areas represented in the analysis area. This figure represents 6% of the combined 10,093 undeveloped acres in those four Areas. With the passage of time and a continuation of ecological processes, all 606 developed acres would eventually be returned to an undeveloped/unroaded condition. There are no other known projects that would cumulatively affect undeveloped/unroaded character within the CEA.

4.3.3.4 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Road building and associated maintenance in a roadless/undeveloped area is an irreversible commitment of the resource to a developed condition for the long-term. Alternative 1 would have no irreversible or irretrievable effects on these resources.

4.3.4 EFFECTS OF ALTERNATIVE 1 ON VISUAL QUALITY

Effects on Visual Quality by the various actions is measured by the amount of visual changes that would take place and their duration. Achieving long-term visual quality goals in a forest environment is a dynamic process. Vegetative treatments sometimes cause temporary periods of unacceptable visual changes, therefore it is important to plan actions so that an attractive sequence of views is maintained and Visual Quality Objectives (VQO's) are met.

The following discussion of Alternative 1 will describe expected changes in the visual landscape within the Pretty Tree Prescribed Fire Project area viewshed. It will be discussed in terms of the effects on the visual elements (form, line, color and texture) expected.

4.3.4.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON VISUAL QUALITY

Guidance for this section is found in the Visual Management System, Agriculture Handbook No. 462, NFLM, Vol. 2. Alternative 1 would treat between 12,950 and 13,600 acres of the 33,938 acre analysis area and the effect would be greater diversity in vegetative species, size, color, texture and vigor.

Visual Quality Objectives (VQO's)

The VQO's for Alternative 1 treatments would be as listed below:

Sagebrush

Alternative 1 would burn 200-250 acres after cutting and scattering PJ to carry the fire. Most of this management activity would occur near FR 153 and would meet a VQO of Retention. Other isolated sagebrush parcels would meet a VQO of Partial Retention.

Oak

Alternative 1 would burn 450-500 acres and repeat in 3-5 years if necessary. This prescribed burn would meet a VQO of Retention in the Foreground of FR153 and Partial Retention in the Middleground of FR 153 because the treatment would replicate existing natural disturbance.

Pinyon/Juniper

Alternative 1 would cut and burn 3000-3500 acres with post treatment reseeding. All of the PJ treatment would occur in the Middleground of FR 153 and would meet a VQO of Partial Retention replicating the effects of natural fire disturbance.

Ponderosa Pine

This prescribed burn treatment would treat 7,000 acres and would meet a VQO of Retention in the Foreground of FR 153 and the Great Western Trail and Partial Retention everywhere else.

Mixed Conifer

This prescribed burn treatment would treat 300-350 acres and would meet a VQO of Partial Retention.

Aspen Burn

Alternative 1 would burn 1,000 acres of aspen with prior cutting of conifers and post treatment fencing if needed. A VQO of Retention would be met in the Foreground of the Great Western Trail and Partial Retention everywhere else.

Aspen Maintenance

Understory conifers would be cut in 1,000 acres of aspen. Treatment would meet a VQO of Partial Retention.

Aspen Regeneration Harvest

With Alternative 1, there would be no treatment on any acres.

Travel Management

Under Alternative 1, roads would be left open or closed in accordance with Map E except that some short, wet sections of Road Draw west of the cattleguard would be realigned and reconstructed.

Landscape Character

Alternative 1 would cause both short-term and long-term changes in landscape character in the analysis area. The character of the stands would change to a more open condition. The forest would be less compact and less dark with removal of some of the overstory and would display greater visual variety. This visual condition would be stable as the vegetation treatment would have reduced the chances of a major insect or fire disturbance.

Dominance Elements

As previously indicated, dominance elements are the simplest visual recognition parts which make up the characteristic landscape. Alternative 1 is discussed below in terms of changes in form, line, color and texture which would occur.

Form: This visual element is usually dominant because of the vast scale involved. Examples in the project area are the rocky ridges and the steep Sand Creek drainage basin. Alternative 1 would have no effect on the land and water forms of the project area.

Line: Live trees and snags provide important vertical line values to the forest landscape. In other instances, horizontal lines such as those made by a road bed, road cuts or fills present an unnatural contrast with the forest floor. With Alternative 1, the verticality of some trees would be more evident because of the increased openness of the forest canopy. The height of the remaining trees would be more evident in relation to the newly seeded and naturally regenerated grasses and forbs on the ground. Any existing road scars currently visible in the middleground of FR #153 would remain visible. In the short term, horizontal lines resulting from the reconstructed portions of Road Draw would be apparent. After one growing season, these lines along with proposed skid trail systems would not be expected to create unnatural landscape lines when viewed from major travel corridors.

Color: Overall, the color element in the landscape would be increased substantially with Alternative 1. In the short-term, disturbances created by the proposed vegetation treatments would result in more burnt blacks showing in the aspen burn adjacent to the Great Western Trail than with the Proposed Action. After one growing season, reseeded and naturally regenerated grasses and forbs would restore the yellow/green colors that would contrast pleasingly with the light aspen greens and the darker greens of the conifers. The grayish brown color of snags would continue to contrast with the dark green conifers and the grayish white trunks, spring greens and fall yellows of the aspen would increase as they proliferate due to patchcuts and burns. Any white sawed log ends and black partially burned slash originating from this action would be removed from Sensitivity 1 road and trail Foreground zones. The creation of large bare brown soil areas from the construction of landings and skid trails would reduce visual quality in the short term. These effects would be

unnoticed after one growing season. The riparian areas would continue to display the present variety of colors.

For trail users, there would be a short-term visual impact since they are traveling at a slow pace and since some trails pass directly through proposed aspen burn units. The opportunity of observing what may be unacceptable visual disturbances to some would be increased until the blackened areas were covered again with new growth. In trail Foreground zones, the mitigating measures stated in Chapter 2 would be applied to keep and/or bring impacts within the parameters needed to meet the appropriate VQO's.

Texture: Under Alterative 1, the overall vegetative texture would be somewhat less coarse than with the Proposed Action because of no treatment in the aspen regeneration harvest area. Any future openings in the more open forest landscape would be less noticeable than at present. Proposed treatments would promote greater irregularity in canopy levels, maintaining textural variety in both the short and long term.

Summary: The desired VQO's would not always be met within the foreground and middleground of primary roads and trails in the analysis area because of debris left from previous sales or treatment activities. Under Alternative 1, these areas would remain as at present.

Alternative 1 does not conflict with the LRMP. The Plan allows timber harvest in the affected management areas and specifies enhancing visual quality. This action would move the project area toward the desired future condition of having increased visual variety through stimulation of aspen clone regeneration and through creation of a greater size range in the conifers.

4.3.4.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON VISUAL QUALITY

With this alternative, the analysis area would become more visually attractive to recreationists. There would be no cumulative visual effects from other nearby vegetation treatment projects. If the Hell's Backbone Road is someday officially designated as a national scenic backway, an increase in visitor use would occur, possibly accompanied by an increase in site degradation.

Other cumulative effects on the visual resource would be those described in Alternative C of the Sand Creek Soil Stabilization Project EA.

4.3.4.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

With Alternative 1, events such as major wildfires and/or other disturbances would less likely change the visual setting. The extent of alteration would depend on the event itself.

No Irretrievable effects would occur to visual quality as a result of Alternative 1. Because vegetation grows back over time, timber harvesting and other proposed treatments would not cause any irreversible impacts. Natural processes such as fire, wind, drought, and natural succession would continue. Visual changes observable from any of the system roads or trails would be subtle .

4.3.5 EFFECTS OF ALTERNATIVE 1 ON SOILS

4.3.5.1 DIRECT AND INDIRECT EFFECT OF ALTERNATIVE 1 ON SOILS

A soil erosion model was used to calculate on-site (treatment areas) soil erosion for each soil under

treated conditions for each of the action alternatives compared to the current erosion rates of the no-action alternative using procedures outlined in the publication Estimating Soil Erosion Losses From Utah Watersheds (Tew, 1973).

During the environmental analysis a critical soils area map, located in the project file (see also Map L, App. 3.), was developed which identified all the areas that would have a possible impact on the soil and water resources. Specific mitigation (soil and water conservation practices) were developed to either avoid completely or to minimize the potential damage to these resources.

All soils proposed for treatment were evaluated from the standpoint of soil erosion relative to soil loss tolerance thresholds (T values).

There are no commercial logging activities included in Alternative 1, therefore the soil disturbing activities associated with mechanical equipment will not occur. Other harvest activities will not remove material from the treated areas and overall impacts of the project will be less. Impacts associated with this alternative will be due to loss of canopy cover and fire effects. A goal when implementing management activities if is to protect long-term soil productivity and soil hydrologic function. On timber sales detrimental effect is defined as 15% reduction in inherent soil productivity potential (FSH 2509.18). The desired future condition following logging activities is that long term soil productivity and hydrologic function will be maintained on as many acres as possible, but at least 85% of the activity area. From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document. (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) During logging activities, sale area maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP 14.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996).

Fire has the potential to affect soils by consuming soil organic matter, altering the physical characteristics and increasing the solar energy absorbed by blackening the soil. Any of these may alter infiltration and erosion rates. However, none of the direct effects are likely to decrease the long term productivity if fire intensities and temperatures are kept low (Bayer, 1996). To ensure no detrimental effect to the soil resource in the project area, soil suitability was determined and unsuitable areas were excluded from logging and fire. Soils and vegetation information was used to exclude areas from burning and define precautions in others (see Map L, App. 3). Soil and watershed considerations are used in prescribe burn planning (SWCP 18.02, SWCP 18.03). Standards and guidelines defined in the Forest Plan will be implemented during logging and burning to ensure soil quality standards are met. Burning will be done when conditions will limit the intensity of the fire, and when burning in large blocks the pattern will be mosaic (not continuous). Logging will include designation of skid trails and endlining, and will be done only when soil moisture conditions are suitable. Where detrimental effects to soil has occurred, either by soil disturbance, compaction or fire intensity, erosion control measures will be implemented. These include seeding disturbed areas, waterbarring skid trails, landings and roads, and scarifying (if necessary) and seeding areas where fire has exposed mineral soil. Monitoring on the Dixie National Forest has shown that when these measures are taken direct, indirect, and cumulative effects are within Soil Quality Standards, and long term productivity is maintained (Bayer, 1996).

Proposed treatment areas occur on following soils:

Aspen maintenance - soil map units 523, 538, 539, and 545
Aspen burn - soil map units 528, 539, 543, and 545
Mixed conifer burn - soil map units 523, 534, and 545
Oak burn - soil map units 523, 532, and 545
Pinyon/juniper burn - soil map units 429, 432, 524, 529, and 532
Ponderosa Pine Burn - soil map units 523, 532, 534, 538, and 545
Sage Burn - soil map units 432, 441, 477, and 524

On-Site Soil Erosion

Soil disturbance associated with the loss of canopy and ground cover in the burned areas will result in an unavoidable short term increase in on-site soil erosion. All treated areas will be within soil loss tolerance thresholds, even during the first year when erosion will be greatest (see table, section 4.2.5.1). The recommended mitigations as well as the relatively low percentage of watershed area harvested would ensure that the likelihood of increases in sediment to streams due to treatment will not be measurable (see section 4.3.6). The treatment areas proposed for burning will not directly result in soil disturbance, but will experience loss of ground cover and canopy cover which will result in some increase in on-site erosion. Resprouting in the aspen, pine mixed conifer, and oak types should result in good ground cover within one to two years; recovery in other vegetation types will take longer. None of the proposed burned treatment areas should result in severely burned soil conditions; if burn areas require, scarifying and seeding will be done to limit soil erosion.

Current erosion rates from the proposed treatment areas average .40 tons/ac/yr. Estimated erosion rates the first year following treatment are .71 tons/ac/yr. Erosion rates will decrease substantially each year thereafter. These erosion rates (both pre and post treatment are very low compared to the allowable 3 to 5 tons/ac/yr (soil loss tolerance threshold needed to maintain long term soil productivity).

Long Term Soil Productivity

Where prescribed burning is done a loss of most of the fine ground fuels which will occur resulting in a release of nutrients held in those fuels. Fire associated with the proposal should result in leaving a sufficient amount of the larger fuels (large woody debris) for long term nutrient cycling which will maintain soil productivity. (Bayer, 1997)

There is no commercial harvest proposed in Alternative 2, therefore there will be no compaction and displacement associated with timber harvest in the aspen (as with other action alternatives). Soil disturbance associated with the loss of canopy and ground cover in the burned areas will result in an unavoidable short term increase in on-site soil erosion (Bayer, 1996).

Forest Plan Consistency

This Proposed Action is consistent with the Land and Resources Management Plan of the Dixie National Forest would reduce the risk of high intensity fire effects on the soil resource due to catastrophic fire.

4.3.5.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON SOILS

The cumulative effects analysis area for long term soil productivity and on-site soil erosion is the

project area itself. The intent is to ensure that proposed management on a project area does n result in reduced long term soil productivity. The cumulative effects analysis evaluates pa management activities, the proposed management activity, and foreseeable future managemen activities. Off-site impacts of sediment are discussed in the hydrology section of the NEPA document. Long term soil productivity is not affected by adjacent projects. Cumulative impacts to soil productivity are the result of additional projects on the same piece of ground, i.e. additional soil erosion, increased compaction, displacement, etc.

Soil quality standards include threshold values for amount of surface organic matter, soil erosion rate and amount of soil disturbance (Bayer 1996). Increased on-site soil erosion rates associated with timber harvest are typically expected to be near natural levels (Bayer 1996). Direct, indirect and cumulative effects from past and ongoing activities are within soils quality standards, and long term productivity is maintained, when unsuitable soils are excluded of from management activities and mitigation measures are applied to offset impacts (Bayer 1996). Unsuitable soils have been excluded through the planning process (LBS Vegetation Treatment Project), and mitigations have been implemented through prescribe burn and timber sale planning and administration.

Previous projects on any of the proposed treatment areas are timber harvests of approximately 10 years ago more recently and prescribe burn activities under the LBS Vegetation Treatment Project. Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management harvest systems were used within most of the ponderosa pine. The timber harvests used a relatively high concentration of skid trails and logging roads. The Affected Environment, Soils section states that under current conditions none of the areas proposed for treatment exceed soil quality standards. Ongoing LBS Vegetation Treatment Projects include pinyon juniper prescribe burning along Hells Backbone Road and aspen harvest in the Road 566 area. Past and present management activities in the Project Area include road maintenance, livestock grazing, fuelwood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, trail riding with mountain bikes and Off Highway Vehicles (OHV's).

Other current management activities that are occurring within the Analysis Area include livestock grazing and dispersed recreational use (hunting, camping, fishing). The proposed mitigation of restricting skidders to skid trails, endlining, and restricting logging when soils are too moist, should result in acceptable cumulative impacts to the soil resource (i.e., minimize increase in compaction, displacement, puddling). As described above, there should be sufficient large woody debris left on site following treatment for long term nutrient cycling which will maintain soil productivity.

Foreseeable future management activities within the Analysis Area include LBS Vegetation Management Project and Sand Creek Soil Stabilization Project. The on-going Sand Creek Soil Stabilization Project is rehabilitating and reconstructing, and closing roads in the Sand Creek watershed that were eroding and/or contributing sediment to streams due to improper location, lack of maintenance and/or lack of proper drainage. The project also incudes rehabilitation of gully systems in the vicinity of sand and Grimes Creek. The project has improved site productivity and reduced sediment delivery from gullied areas to Sand Creek.

4.3.5.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There will be short term unavoidable increase in on-site soil erosion.

Short Term vs. Long Term Productivity - Burning will result in a release of nutrients immediately following the fire. There should be sufficient large woody debris left on site for long term nutrient cycling which will maintain soil productivity.

Irreversible/Irretrievable Commitments - There should be no irreversible commitments to the soil resource.

4.3.6 EFFECTS OF ALTERNATIVE 1 ON WATERSHED

4.3.6.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON WATERSHED

If Alternative 1 is implemented, the transportation and vegetative management activities summarized in Chapter 2 would be implemented. Transportation management would be implemented to close roads within the project area which are no longer necessary for administrative use. Seasonal closure would also be implemented on many roads within the project area. An OHV loop would be developed from the trailhead at the end of Road 566 around Haw's pasture and back through Road Draw road. Also included are action described in section **4.2.6.1,** under the heading "Actions Common to all Action Alternatives" (when applicable). An area closure which would prohibit vehicular travel off of roadways and designated trails would also be implemented.

Water Quantity and Streamflow Regime

Trees have a direct influence over the amount of precipitation input available for stream flow because they transpire water, intercept precipitation which is then evaporated or sublimated directly back into the atmosphere, and modify the understory evapotranspiration environment (Kaufmann et. al, 1987). Any factor that reduces basal area or Leaf Area Index (LAI) of the forest will increase runoff to some degree (Shepperd et. al, 1991). Following fire or harvest, loss of ground cover and change in vegetation type (such as proposed in aspen or pinyon/juniper stands) will cause changes in infiltration and runoff. In aspen stands, where the objective of harvest and prescribed burning is to kill all the trees, the fire will also result in lower transpiration rates, especially during 3 years following the burn, but also in the longer term (Gifford, 1983). Where conifer has been killed in favor of deciduous trees (such as in aspen maintenance areas), more solar radiation will reach the snow surface and a more rapid snowmelt is expected (Dunne and Leopold, 1978), and transpiration will decrease (Gifford, 1983).

These changes may or may not increase streamflow or timing of streamflows, depending on treatment site locations and natural variations in precipitation, snowpack and rate of snowmelt. Streamflow changes also depend on the percentage of watershed area treated and watershed characteristics (Kendall, 4/1997). Studies on the effects of burning on water yield have been done mostly on high intensity fires, and information on moderate or low intensity fires is scarce. Applying the analogy of a burn as a vegetative removal, studies of vegetative removal may be used to predict loss of vegetation due to fire. Considering only vegetative removal, it has generally been noted that 20% to 30% of a watershed must be harvested before a significant change in flow can be noted (Troendle, 1982). A watershed experiment in northern Utah which harvested 13% of the watershed using aspen clearcut showed no measurable increase in water yield (Johnston, 1984). A review of 94 catchment experiments concluded that when vegetative cover is removed, all but 1 resulted in an increase in water yield, however results were not consistent regarding that amount of the increase, length of treatment effect, or the effect on stream flow and timing or peak flows (Bosch and Hewlett, 1982).

In areas where tree cutting and prescribed fire which kills trees (see summary table, section 4.2.6.1), water yield is expected to increase. Burning which removes vegetation, and harvest, would reduce canopy closure and basal area. A decreased basal area would result in local increased water yield and may result in a small increase in runoff from the affected areas (Johnston, 1984, Troendle, 1982). Summer time evapotranspiration is influenced by forest type and structure (Troendle, 1982). At the watershed scale Alternative 1 would maintain present forest type and structural characteristics (summary table documents that less than 9% of the affected watersheds will undergo a vegetative change during the time span of the project). Vegetation in lower elevations (primarily P-J stands) utilize summer precipitation and stored water in the soil, and causes a depletion of excess soil water during the summer months (as evidence by the lack of springs, see app 3, map M). Following aspen treatment there is not expected to be a surplus of water available from harvest areas during summer months (Johnston, 1984). Therefore, the majority of the water yield increase from the project area would be during spring runoff, and would not be discernible from larger, natural variations (Troendle, 1982) (Johnston, 1984).

Water Quality

Burn Activities

The Environmental Consequences, Soils section predicts that prescribed burning on the proposed treatment areas will result in a loss of most of the fine fuels while leaving sufficient larger fuels required for nutrient cycling. Burning will not result in any direct soil disturbance, but will cause loss of ground cover and canopy cover, resulting in an increase in on-site erosion. This increase would be well within soil loss tolerance thresholds (see section **4.2.5**). Following fire, erosion rates within burn areas will increase but long term elevated erosion rates are not expected (USDA Forest Service 1981, Elliot 1998). The amount of increase is extremely variable and is a function of the intensity of burn, slope, and proximity to streams. Water quality degradation may result from excessive amounts of nutrients, sediment or detritus (Kendall, 1/1997), and water quality standards may be exceeded in short term due to storm runoff. These effects will be minimized by conducting burn in accordance with burn plans (SWCP 18.02) and applying mitigations as part of the project plan (see Chapter 2, Mitigations section). Watershed monitoring on the Dixie National Forest has indicated that when prescribe burning is done within burn parameters, no short term adverse effects to hydrologic function and short term soil loss is minimal (Dixie National Forest, 1997; Dixie National Forest, 1998). Included in mitigations are the use of no burn areas (buffers) to limit sediment delivery to stream wetlands and riparian areas. Buffers, or Streamside Management Areas (SMAs), are widely recognized to be highly beneficial to water quality and aquatic habitat (EPA, 1993). Vegetation in SMAs reduces runoff and traps sediments generated from upslope activities, and reduces runoff before it reaches surface waters (same reference).

Harvest Activities

There are no commercial harvest activities proposed as part of Alternative 1. Hand thinning, and hand thinning prior to burning are expected to have virtually no effect on watershed resources.

Travel Management

During project implementation, construction of the OHV trail will contribute sediment to streams at stream crossings, including Bear Creek and a tributaries to Bear Creek. Water quality standards may be exceeded for short periods of time during construction. A trail construction erosion control plan (SCWP 15.03) will be used to incorporated measures to minimize sediment contribution from construction activities. Measures will include specifications for timing of construction activities (SWCP

15.04), slope stabilization (SWCP 15.05), and control of permanent drainage (SWCP 15.07). Trails design at stream crossings will incorporate SWCP's, such as crossing stream at right angles and proper drainage at crossings; these measures will ensure sediment contribution from the trail will be minimized. Stream alteration permits for stream crossings will be acquired from the State where necessary by law. By incorporating SWCPs into project activities effects on the stream system will be limited to areas immediately below the proposed crossings, and trail construction will not adversely affect Beneficial Uses of water downstream; this is in compliance with State nonpoint source water quality laws.

Travel management activities other than OHV trail construction, including road closures, are expected to have an overall favorable effect on water quality in the long term. During and following soil disturbing activities erosion rates can be expected to increase until disturbed areas are stabilized, typically 3-5 years (USDA Forest Service, 1981). Utilizing BMPs, previously described in this section under "Action Common to all Action Alternatives" heading, will ensure that impacts to water quality are minimized and in compliance with State and Federal water quality laws.

Considering the above discussion, it is not expected that beneficial uses of water will be impacted and the action is in compliance with State an Federal water quality laws.

Forest Plan Consistency

Alternative 1 is consistent with the LRMP of the Dixie National Forest, more specifically implementing the project will not violate watershed related Standards and Guidelines described in Chapter IV of the LRMP. Alternative 1, if implemented, would reduce the risk of cumulative watershed effects due to catastrophic fire.

4.3.6.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON WATERSHED

The cumulative effects area (CEA) for watershed analysis includes the drainages that receive water from within the Project Area, Sand Creek and Boulder Creek within National Forest Boundary. The CEA was chosen because of the natural boundaries of watershed resources. Flow from these drainages is used for culinary year round, and irrigation downstream during the months of May to October. During the remainder of the year this water flows into the Escalante River, then to the Colorado River.

Baseline cumulative effects analyses have been completed on the cumulative effects area using the Watershed Condition Rating (USDA 1993). Both Sand and Boulder Creeks are rated as good Watershed Condition Rating. The Watershed Condition Rating describes the relative condition (good, moderate, or poor) of the watershed, and provides some insight into the risk of cumulative effects (i.e. sedimentation, channel and aquatic habitat degradation, etc.) resulting from increased water yields, peak flows, and/or excessive erosion. The Watershed Condition Rating is based on road density and past vegetative disturbances (i.e. timber harvest, mortality, and fire).

Past and present management activities in the Project Area include road construction, road maintenance, timber harvest, livestock grazing, fuel wood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, and trail riding with mountain bikes and Off Highway Vehicles.

Recreation access to McGath Lake is via poor road locations that have steep grades and that are located through the center of wet meadows. Past management activities including terracing and

seeding gully areas are evident. The Affected Environment, Soils section of this document identifies several existing conditions within the cumulative effects area, including inadequately maintained and poorly located roads, gullies, and a slump. These have been addressed in a NEPA analysis, Sand Creek Soil Stabilization Project.

Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management systems were used within most of the ponderosa pine. Timber harvest activities resulted in construction of skid trails and logging roads. The Affected Environment, Soils section state's that under current conditions, none of the areas proposed for treatment exceed any of the soil quality standards.

Water and sediment yield is expected to increase slightly due to harvest activities. The water yield increase would occur during spring runoff, are not expected to be measurable compared to natural variations (section 4.2.6.2). Increased sediment yield from project activities are not expected to contribute measurably to existing sources within the watershed (section 4.2.6.2). The proposed activities will not greatly affect the overall seral stage or roads density of the cumulative effects area (Sand and Boulder Creeks Watersheds), factors considered when determining the risk of cumulative watershed effects (USDA Forest Service, 1993). Considering these factors, it is unlikely that Alternative 1 will to cumulative watershed resource effects.

Monitoring of prescribed fire and past timber sales on the Dixie National Forest during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation (Dixie National Forest, 1995; Dixie National Forest, 1996; Dixie National Forest, 1997; Dixie National Forest, 1998). If erosion on disturbed sites is controlled or prevented, it is assumed that water quality degradation, associated with sedimentation, will be prevented. Implementation of Alternative 1 will have no long term impact on the hydrologic function or water quality within the watershed. Proper implementation of SWCPs will minimize soil loss and prevent any potential impacts to downstream water quality (Kendall, 1/1997, Kendall, 4/1997).

4.3.7 EFFECTS OF ALTERNATIVE 1 ON FISHERIES

4.3.7.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON FISHERIES

This alternative would not adversely affect the fisheries. This alternative would have similar beneficial effects as the Proposed Action.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources management Plan of the Dixie National Forest and would move the analysis area toward a desired watershed condition for fish habitat.

4.3.7.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON FISHERIES

This alternative would not result in adverse cumulative effects to fisheries. This alternative would have similar effects as the Proposed Action.

4.3.8 EFFECTS OF ALTERNATIVE 1 ON WILDLIFE

4.3.8.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON WILDLIFE

General Habitat Conditions

Implementation of this alternative would result in similar habitat effects as the Proposed Action with introduced disturbances to the principal habitats.
Within the **aspen habitat**, this alternative would provide the following habitat conditions:

- about 35% of the aspen habitat in a young age-class condition (all with high snag density),
- about 30% of the aspen habitat to a relatively pure aspen stand of mature to old age-class condition, and
- about 35% of the aspen habitat left in mature to old age-class with varying amount of encroaching conifers.

Roughly 1,000 acres of young age-class habitat conditions would be provided. These acres of young age-class habitat condition would be achieved solely by burning. With this alternative, the full 1,000 acres of young age-class aspen habitat condition would be left stocked with a high density of snags and varying amounts of green live trees left remaining in clumps and scattered across the treated acres, due to non-uniform distribution of fuels to carry an even burn pattern.
Within the **mixed conifer**, **ponderosa pine**, **sagebrush**, **pinyon-juniper**, and **oak habitats**, the acreage treated and the effects of this alternative would be the same as described for the Proposed Action.

Open Road Density

This alternative would affect wildlife in two manners. The first would be a decrease in open-road density to 1.0 mile per square mile. This would result in less disturbance to wildlife within the analysis area.

Secondly, this alternative would increase the period of seasonal road and area closures in the Sand Creek drainage and the Sweetwater Creek drainage, by including all hunt periods, starting with bow hunting in August and ending after the last turkey hunt in late May. The area closure would not apply to over-the-snow motorized travel, as snowmobiles. Where snow accumulation would be sufficient for most snowmobile recreationists, most wildlife as deer, elk and turkey would not be in the same snow-depth zone, and consequently not harassed by such motorized activities. The effect of this extended road and area closure period would be a reduction in overall disturbance to wildlife from fall through spring.

This alternative would reconstruct portions of Road Draw Road to eliminate damage being incurred to a wet meadow and other sites where seeps run onto the roadbed. Reconstructing these portions would not add to the road density or to general wildlife disturbance. Reconstructing these portions would benefit wildlife species, as salamaders, and wetland plant species by providing a solid roadbed across the wet meadow and eliminating the multiple traffic lanes crossing the meadow, and by reducing sediment input into drainages from the other wet areas along the road.

Management Indicator Species

This alternative would have similar effects for Management Indicator Species as the Proposed Action. There would be a slight increase in snags created due to the increased acres of aspen burning. The northern flicker would be the Management Indicator Species associated with snags. A higher acreage of snag density would be a short-term benefit, providing additional foraging structures, until the snags felled. After the snags fall, the long-term effects would be similar to the Proposed Action. This alternative is similar to the Proposed Action in acreage of pinyon-juniper that would be treated and effects to deer and elk winter range. The overall forage ratio for the analysis area would be 31%. Alteration of age-class in "browse stands" would be 19% within a ten-year period; similar to other action alternatives.

Threatened and Endangered Species

This alternative would have the same no effects as the Proposed Action.

Sensitive Species

This alternative would not result in loss of species viability nor lead to future listing as threatened or endangered. This alternative would have similar effects for Sensitive-listed species as the Proposed Action. One slight variation would be the difference in acres of snag densities in the created young age-class aspen condition, as described above.

The three-toed woodpecker would be the only Sensitive-listed species associated with the snags remaining in the created young age-class aspen stands. Nesting territories would not change much between the action alternatives, since the lower level of snag density on the harvest acres of the other action alternatives would still provide nesting structures. The variance in quantities of foraging structures might have a slight effect on nesting success of some individual nesting pairs of woodpeckers, though such would be difficult to assess, due to the higher percentage of aspen habitat retaining suitable foraging conditions.

General Diversity Pattern

This alternative would be comparable to the Proposed Action, with a general enhancement in diversity pattern resulting from the similar treatments. An exception of this alternative to the Proposed Action would be all acres of young age-class aspen condition created by this alternative would have a high snag density across the full acreages of the burns. This alternative would have similar diversity of wildlife and plant species as the Proposed Action.

Non-Native Wildlife and Plant Species

This alternative would not promote non-native wildlife species. This alternative would be similar to the Proposed Action, which would consider introduction of non-native plant species. The effects are discussed in the Proposed Action.

Wildlife Corridors

The effects of this alternative would be the same as described for the Proposed Action.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired condition for wildlife and plant habitats.

4.3.8.2 CUMULATIVE EFFECTS OF PROPOSED ACTION ON WILDLIFE

The area of influence for the cumulative effects is the same as for the other alternatives.

General Habitat Conditions

The effects of this alternative would be similar to the Proposed Action. The one exception would be the greater number of aspen snags provided by burning roughly 1,000 acres of aspen, instead of applying a harvest treatment to some of the aspen acres which would leave a lesser density of snags in the harvest units.

Open Road Density

The effects of this alternative would be similar to the Proposed Action.

Management Indicator Species

The effects of this alternative would be same as the Proposed Action.

Threatened and Endangered Species

The effects of this alternative would be the same as the Proposed Action.

Sensitive Species

The effects of this alternative would be same as for the Proposed Action.

General Diversity Pattern

The effects of this alternative would be the same as for the Proposed Action.

Non-Native Wildlife and Plant Species

The effects of this alternative would be the same as for the Proposed Action.

Wildlife Corridors

The effects of this alternative would be the same as for the Proposed Action.

4.3.9 EFFECTS OF ALTERNATIVE 1 ON FIRE

4.3.9.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON FIRE

Fire Group 0

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 0, section 4.2.9.1).

Fire Group 1

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 1, section 4.2.9.1).

Fire Group 2

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 2, section 4.2.9.1).

Fire Group 3

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 3, section 4.2.9.1).

Fire Group 5

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 5, section 4.2.9.1).

Fire Group 7

There are two different treatments prescribed for this FG, the aspen burn, and aspen maintenance.

The aspen burn would encompass approximately 1,000 acres, this burns an additional 300 acres over the Proposed Action. The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 7, aspen burn, section 4.2.9.1).

The aspen maintenance treatment, the direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 7, aspen maintenance, section 4.2.9.1).

A pure FG 7 would be self sufficient in maintaining a properly functioning condition (PFC), these types of stands can be characterized as fire resistant and act as a fire break. Current stand conditions are declining in health, and are unable to maintain themselves in a PFC. As the current aspen component is lost, fuel loads would increase, a continuous fuels layer would be established, and mixed conifer would dominate these stands. Fuels characteristics of this nature would burn with extreme intensity. When a unwanted wildland fire would occur, suppression efforts would be difficult, slow, dangerous, and very costly.

Fire Group 10

No treatment is planned for this fire group under Alternative 1, the direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 10, section 4.2.9.1).

Forest Plan Consistency

Under this Alternative, there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. The Desired Conditions and Need for Change listed within the LRMP, for both fuels management and prescribed fire would be moved toward. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would also be met.

4.3.9.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON FIRE

All Fire Groups

Within the Cumulative effects area (ESFMZ) past activities along with fire suppression policies has led to conditions prone to large scale wildfires of catastrophic proportions (Federal Wildland Fire Management Policy & Program Review, 1995). Large wildfires are very difficult, dangerous, and costly to suppress. The risk of wildfire is particularly important in terms of fires which may occur on the National Forest lands and have the potential to burn onto private lands. Implementation of this alternative would reintroduce fire to (11,950 - 12,600) acres of land, and treat an additional 1,000 acres of fuels. The additional vegetation treatments would also reduce potential fire spread. All treatments would reduce the threat of a large scale wildfire. This treatment would increase future opportunities of allowing naturally ignited fires to burn under specified conditions. Within the LBS analysis area an additional 416 acres would be treated utilizing prescribed fire, thus reducing additional fuel load levels. Any other treatments would also reduce the threat of a large scale wildfire. In general the number of acres, and the intensity at which these would burn would be reduced. Within the sagebrush the intensity at which fires would burn would be reduced, but the size of these fires may increased, due to available ground fuels (grass/forbs).

4.3.10 EFFECTS OF ALTERNATIVE 1 ON HERITAGE RESOURCES

Proposed activities would not impact known historic properties. Therefore, there will be no effects.

4.3.11 EFFECTS OF ALTERNATIVE 1 ON SOCIO/ECONOMICS

4.3.11.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON SOCIO/ECONOMICS

Implementation of this alternative would not result in the removal of timber for forest product removals. As such, the opportunity to provide forest products to area industry would be lost. Especially important is the lost opportunity to provide aspen logs to the developing aspen industry before aspen decadence/mortality.

The design of the various burning and mechanical treatment projects would improve game habitat, particularly in terms of turkey, deer and elk, thereby potentially increasing the recreational hunting opportunities over the long term as measured by the total acres of treatment, 12,950-13,600 acres.

Treatments in the pinyon-juniper and sagebrush may reduce deer feeding in the Salt Gulch and Boulder ranches and thereby reduce deer depredation permits. Overall, the various fuel treatments would reduce the risk to catastrophic fire and their suppression costs.

Economics

The costs of implementing this alternative are as follows:

NFMA/NEPA planning	$66,500.00
Road Improvements	$ 5,000.00
Road Closure Gates	$ 5,550.00
Sagebrush Burning	$5,625.00
Pinyon-Juniper burn	$100,750.00
Oak burn	$18,050.00
Ponderosa pine burn	$630,000.00
Mixed Conifer burn	$29,250.00
Aspen burn	$31,000.00
Total Costs	$891,725.00

4.3.11.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON SOCIO/ECONOMICS

Alternative One does not provide additional public benefits to local jobs or income generated from the forest products industry, and does not make fuelwood available beyond current levels. Given the small potential of this project area to yield substantial forest products, under this analysis, there would, most likely not be an adverse cumulative effect of the alternative in limiting the wood supply to the Garfield County economy.

4.3.12 EFFECTS OF ALTERNATIVE 1 ON AIR QUALITY

4.3.12.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON AIR QUALITY

Parameters

There are five parameters important to the determination of air quality and its potential effects. These include amount of airborne particulates, gaseous pollutants, visibility, Prevention of Significant Deterioration (PSD) designation, and proximity to residential private subdivisions or Class I airsheds.

Existing Airborne Particulates

The direct and indirect effects on existing airborne particulates under this alternative are the same as the Proposed Action, (see the Proposed Action, existing airborne particulates, section 4.2.12.1).

Fire Group 0

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 0, section 4.2.12.1).

Fire Group 1

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 1, section 4.2.12.1).

Fire Group 2

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 2, section 4.2.12.1).

Fire Group 3

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 3, section 4.2.12.1).

Fire Group 5

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 5, section 4.2.12.1).

Fire Group 7

Prescribed burning would take place on 1,000 acres in this fire group. Based on 1,000 acres being burned with 5 tons per acre being consumed and an emission factor of 25 lbs. per ton, 62.50 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial as most of the emissions would be produced within the first 6 hours of ignition each day, and would then dramatically decrease each day. It is estimated that a small amount of residual smoke emissions would be evident for up to 3-5 days following each day of ignition. Implementation of the burn could take up to five years to complete. The Utah Smoke Management Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Within the 1,000 acres of aspen maintenance no burning would take place. However there would be a small increase in the amount of carbon monoxide and fugitive dust produced, as result from conifer removal. This increase would be short term, and only take place while the conifer is being removed.

No treatment would take place within the aspen regeneration harvest. The indirect effect of no treatment could lead to a violation of air quality standards in the future if an unwanted wildland fire occurs.

Fire Group 10

Within this fire group no action would take place, The direct and indirect effects under this alternative, and for this Fire Group are the same as the Proposed Action, (see the Proposed Action, FG 10, section 4.2.12.1).

Forest Plan Consistency

Under this Alternative there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. Desired Conditions and Need for Change listed within the LRMP, for fuels management, air quality, and prescribed fire would be met. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would be met.

Emission Production and Duration

The direct and indirect effects on emission production and duration under this alternative are the same as the Proposed Action, (see the Proposed Action, emission production and duration, section 4.2.12.1).

Gaseous Pollutants

The direct and indirect effects on existing gaseous pollutants under this alternative are the same as the Proposed Action, (see the Proposed Action, gaseous pollutants, section 4.2.12.1).

Visibility

The direct and indirect effects on visibility under this alternative are the same as the Proposed Action, (see the Proposed Action, visibility, section 4.2.12.1).

Prevention of Significant Deterioration (PSD)

The direct and indirect effects on prevention of significant deterioration under this alternative are the same as the Proposed Action, (see the Proposed Action, PSD, section 4.2.12.1).

Proximity to Private Subdivisions or Class I Airsheds

The direct and indirect effects on proximity to private subdivisions or class I airsheds under this alternative are the same as the Proposed Action, (see the Proposed Action, proximity to private subdivisions or class I airsheds, section 4.2.12.1).

4.3.12.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON AIR QUALITY

The cumulative effects of this alternative are generally the same as the Proposed Action, (see Proposed Action, air quality, cumulative effects, section 4.2.12.2), the only difference would be that 1,247.1 tons of particulate matter would be produced from the prescribed activities.

4.3.13 EFFECTS OF ALTERNATIVE 1 ON LIVESTOCK GRAZING

4.3.13.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON LIVE STOCK GRAZING

The greatest potential effect from Alternative 1 would develop from the regeneration treatment within the aspen stands. These areas treated would attract livestock especially when adjacent to key areas. If construction of a fence is necessary to protect aspen regeneration in the burn unit above Haws Pasture, then approximately 690-790 acres would be lost temporarily (3-5 years) from transitory grazing. However, if the project is implemented in a 1-2 year period, the extent of the

treatments will diffuse grazing intensities to the extent that a fence should not be necessary. Treatments in the sagebrush, PJ, and oak could also attract increased grazing intensities, but would be regulated by standards and guidelines of the term grazing permit. Some areas, such as Pretty Tree Bench are not grazed, and should not receive additional grazing pressure. Treatments in the ponderosa pine and mixed conifer should not effect grazing activity.

Livestock will benefit over the long term from these treatments from the increase in forage quantity and quality by the total acres of treatment, 12,950-13,600 acres. Maintenance for aspen stands versus conifer conversion will result in higher forage production. Studies have shown that within aspen stands (Harniss, 1982), increases of 20 basal area/acre of conifer trees can reduce understory production by more than half. Furthermore, conifer conversion will reduce water yields, and reduce plant diversity. Therefore livestock will benefit from the 1,000 acres of aspen regeneration and 1,000 acres of aspen maintenance. These treatments occur on transitory range and will not lead to changes in livestock numbers.

4.3.13.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON LIVESTOCK GRAZING

In addition to the cumulative effects described in the Sand Creek Soil Stabilization Project (EA, chapter 4, pages 101-102), and LBS Vegetation Treatment Project (EA, Chapter 4, pages 68-69) there would be an increase in quality of forage commensurate with the total acres of treatment, 12,950-13,600.

4.3.13.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

The Proposed Action would cause no adverse effects nor any irreversible/ irretrievable commitments in relation to Livestock Grazing.

4.3.14 EFFECTS OF ALTERNATIVE 1 ON SPECIAL USES AND ON MINERALS

4.3.14.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON SPECIAL USES AND ON MINERALS

This alternative would be similar in any effects as the Proposed Action alternative.

4.3.14.2 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON SPECIAL USES AND ON MINERALS

This alternative would be similar in effects as the Proposed Action alternative.

4.3.15 EFFECTS OF ALTERNATIVE 1 ON TRAVEL MANAGEMENT

4.3.15.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 1 ON TRAVEL MANAGEMENT

The effects of implementing Alternative 1 on travel management would be a result of the amount of road reconstruction, the amount of roads remaining open to motorized travel and the amount of roads on which the type of use is being altered. The direct and indirect effects of the management activities are disclosed in the proceeding resource sections.

Travel management activities under Alternative 1 are the same as those identified for the Proposed Action with the following exceptions; that portion of Forest Road 514 located in the meadow would be relocated to an area where proper drainage could be achieved, and that portion of Forest Road 166 between Haws Pasture and Forest Road 514 would be closed to all motorized vehicles except OHVs. This would result in 52.9 miles of road open to motorized travel. Appendix 3, Map I graphically depicts the roads which would remain open, those which would be seasonally closed, the area of road relocation, and the OHV Loop.

Approximately 17,500 acres within the project area would be open to travel by snow machines.

Alternative 1 is consistent with the direction provided in the Land and Resource Management Plan for the Dixie National Forest. Implementation of Alternative 1 would move the analysis area towards the Desired Future Condition as described in Chapter 1.

Road Density

The open road density within the analysis area would be 1.0 miles per square mile.

4.3.15.3 CUMULATIVE EFFECTS OF ALTERNATIVE 1 ON TRAVEL MANAGEMENT

Travel management activities directly and indirectly effect the other resources within the analysis area.

Effects of sedimentation due to road reconstruction, road closures, or changes in use are discussed in the proceeding resource sections of this document.

4.3.15.4 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ

There would be no irretrievable or irreversible commitment of resources with the implementation of Alternative 1. The irreversible or irretrievable commitment of the resource would be similar to those described under the Proposed Action.

4.4 ALTERNATIVE 2

4.4.1 EFFECTS OF ALTERNATIVE 2 ON VEGETATION

4.4.1.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON VEGETATION

Forest Ecosystems

Ecosystems

Approximately 200-250 acres of existing **sagebrush** stands would be treated with stand replacement prescribed fire followed with seeding where current seed source is inadequate. This action would create patches of grass/forbs with little if any sagebrush and conifer trees. It is expected that within 2-3 years sagebrush regeneration would initiate. Overall, this action would create a better balance of age classes more representative of historic fire frequencies and patterns (Draft Properly Functioning Condition - Process-- 12/23/96, pages 28, 14-15, 17-19, Draft PFC for Major Vegetation Types, pages 4, 16-17, 19-22).

Within the **PJ** zone 300-350 acres, would be treated with a combination of cutting and prescribed fire to create more open or savannah like stand conditions with grass/forbs/shrubs established in the interspaces. This treatment would occur in areas conducive to fire, such as high density stands adjacent to sagebrush flats, as opposed to open stands on rocky hillsides. This action would result in greater representation of a seral stage of stand development characteristic of the natural or historic periodic fire regime. In some cases the stands would revert back to early grasses. Studies indicate (Gottfried, 1996) in Utah, juniper will be the first tree species to invade with tree dominance occurring in 70 to 80 years. In other cases fire will create open savannah like stands with greater concentrations of ground vegetation in openings. Areas treated with fire which are lacking in grass/forbs seed sources or are subject to erosion will be seeded. Restoration of PJ sites to restore ground vegetation require a combination of tree thinning and application of grass seed (Chong, 1994). Elimination of livestock grazing alone will not restore areas (Chong, 1994, Bunting, 1986). The overall effect of this treatment will be greater diversity of stand densities, age classes, and increased understory vegetation. Conditions will also more closely mimic those within the historic ranges (Draft Properly Functioning Condition - Process-- 12/23/96, pages 23, 10-11, 13-14, Draft PFC for Major Vegetation Types, pages 4, 12-13, 19-22).

Burning of 450-500 acres of **oak** brush, would rejuvenate the oak clones into a younger, seral stage of new oak sprouts (Clary and Tiedemann, 1993). Conifer trees found within the oak would be removed from burning, thus creating snags. Burning the oak stems would stimulate sprouting. This action would provide greater diversity of stages of oak stand development more characteristic of historical fire disturbances (Draft Properly Functioning Condition - Process-- 12/23/96, pages 25, 12-13, 15-16, Draft PFC for Major Vegetation Types, pages 4 and 15, 19-22).

A cool surface fire treatment would be prescribed on approximately 7,000 acres of **ponderosa pine** stands. This action is designed to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir (Covington and Moore, 1995). Mortality to some live ponderosa pine trees would increase snag densities and provide areas suitable for pine regeneration. Generally this action will move stand conditions more closely associated with the historic frequent fire regime (Sackett, 1990) and reduce the risk to catastrophic fire (Draft Properly Functioning Condition - Process-- 12/23/96, pages 22, 9-10, 12-13, Draft PFC for Major Vegetation Types, pages 4, 10-12, 19-22).

Aspen would experience three different treatments; 425 acres of removal of understory conifer trees, 166 acres of aspen regeneration using harvest methods, and 830 of aspen regeneration using stand replacement fire. The removal of understory conifer trees is designed to provide more areas in which aspen will dominate now and in the near future (Harniss, 1982, Alder, 1970). Both regeneration treatments would be designed to kill the existing conifer and aspen trees, thereby stimulating the aspen sprouting (Schier, 1975, Debyle and Winokur, pg 197-198, Brown, 1985) and eliminating conifers. Aspen sprouting would occur within 1-3 years. Initial suckering rates can be as high as 10,000-30,000 tree per acre with 65% mortality within ten years (Hittenrauch, 1984). The intensity of the treatments in terms of tree removal/mortality was based on suckering rates increasing with degree of tree removal, clearcutting being optimum (Hittenrauch, 1984, Frykman, Jacobi, 1990). The 996 acres of aspen regeneration will create a better balance of age and structural class diversity of aspen and reduce the succession to conifers across the project area. The long term effect of these treatments would be to establish young healthy seral aspen clones with minimal conifer composition, capable of survival, and serving in the future as replacement old growth/dominant aspen stands as other aspen stands not regenerated succeed to conifers. Use of fire on 830 acres will mimic the historical disturbance effect of fire behavior. Overall these treatments will create conditions closer to

those found within the historical range, patterns, and structural stages (Draft Properly Functioning Condition - Process-- 12/23/96, pages 17, 3-4, 9-10, Draft PFC for Major Vegetation Types, pages 4, 7-9, 19-22).

The **mixed conifer** zone would have 300-350 acres of cool surface fire prescribed. The intent of this treatment is similar to that proposed in the ponderosa pine in which fire would be used to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir. Mortality to some live ponderosa pine/Douglas-fir trees would increase snag densities and provide areas suitable for pine/Douglas-fir regeneration. Generally this action will move stand conditions more closely associated with the historic frequent fire regime and reduce the risk to catastrophic fire (Draft Properly Functioning Condition - Process-- 12/23/96, pages 19-205-7, 10-12, Draft PFC for Major Vegetation Types, pages 4, 9-10, 19-22).

Ecosystem Health

The use of harvest and burning methods in the sagebrush PJ, oak, ponderosa pine, aspen and mixed conifer would mimic disturbances associated with the historic fire regime. Sagebrush ecosystems would be restored to a better balance of age classes and range increased to more historical levels. The effect would be creation of stand fuel conditions within the ponderosa pine and mixed conifers more closely associated with a frequent fire regime while increasing snag distribution in the previously harvested stands. Decadent aspen stands would be rejuvenated. Seral, conifer free stands of oak would be created. This would have the net effect of increasing the health of the ecosystem for both the short and long term by the overall acres treated, (9,671 - 9,871).

Stand Health

The effect of stand replacement fire in 200-250 acres of sagebrush will be to create a more diverse ecosystem of age structure diversity which improves the overall health of the sagebrush stands.

Within the treated 300-350 acres of PJ, stand health would be improved in the short term by substantially decreasing stand densities. Over the long term, creation of a younger stand of PJ and a more heterogenous landscape would reduce the potential for insect activity as compared to a mature homogenous stand. In addition, creation of a mosaic of stand conditions, reduces the potential for a landscape level disturbance and will create stand conditions conducive to more frequent fire.

Treatment in the oak would rejuvenate the existing oak, eliminating conifer encroachment, and creating a younger and healthier stand of oak. Over the long term, these stands would provide longer term stability than the untreated clones.

7000 acres of prescribed fire within the ponderosa pine and 300-350 acres within the mixed conifer would have the benefit of releasing nutrients currently held in the leaf litter to surrounding trees. Reducing both the ground and ladder fuels would provide greater security against stand replacement fire throughout the conifer belt. Some tree mortality, generally less than 5%, would be expected to accomplish the burning.

The aspen treatments would rejuvenate the diseased, mature stands of aspen, thus creating younger, disease free clones. These clones would be more capable of surviving over the long term.

These treatments would have the net effect of increasing the health of the stands for both the short and long term by the overall acres treated, (9,671 - 9,871).

Productivity

The short term effect of surface fire within the ponderosa pine and mixed conifer will be the availability of nutrients released by the burning versus the loss of trees and nutrients caused by extreme fire behavior. Release of nutrients will improve individual tree growth rates. Tree mortality will create understocked openings and loss of stand productivity. The long term effect will be, more resilient conifer ecosystems to catastrophic losses from stand replacement fire.

Within the aspen zone, removal of the existing trees would reduce current site utilization. It is estimated that it will require approximately 15 - 20 years for these stands to return to existing site utilization levels. Once this occurs, productivity would increase as a young healthy, fully stocked stand of aspen grows towards maturity.

Overall, there will be some losses to stand productivity over the short term by the 9,671 - 9,871 acres of treatment. However, long term stand productivity would be improved by those same treated acres with the reduction of risk to stand level mortality and understocking.

Vegetative Structural Stage Distribution

Within the Side Hollow Nest Area, there would be 18 acres of aspen maintenance in which understory conifers would be removed non-commercially, and 93 acres of underburning in the ponderosa pine. Both of these treatments are acceptable methods for managing nest area vegetation and will move the area towards a more desirable condition (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 21-22) by removing undesirable understory trees with non-uniform spacing using hand tools. Also within the PFA, 223 acres of ponderosa pine underburning and 4 acres of aspen regeneration harvest are proposed. This action also utilizes acceptable methods and effects by increasing snags, reducing hazardous fuels and recycling nutrients, and encourage aspen and oak regeneration (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 22-26).

For the Sand Creek home range, the nest area would have 30 acres of aspen maintenance and 134 acres of ponderosa pine. Within the PFA, there would be 557 acres of ponderosa pine underburning. Effects would be similar to those described under the Side Hollow home range.

No Treatments are planned in the McGath Lake nest area. However, within the PFA. Up to 38 acres of aspen would be treated with fire, thereby regenerating approximately 20% of the aspen stands.

Within the foraging areas the following would occur; 377 acres of aspen maintenance, 162 acres of aspen regeneration harvest, and 616 acres of aspen regeneration burning, 5,993 acres of ponderosa pine underburning, and 300-350 acres of mixed conifer underburning. Although specific aspen management for the northern goshawk have not been developed, applying the general habitat principles would provide suitable habitat management. For aspen, management would create a variety of VSS classes through the regeneration methods, provide more stable aspen through understory removals, increase snags via burning, and recycle nutrients (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 26-30). The "Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah (1998) provides for use of local assessments in designing treatments in aspen habitat. The planned aspen regeneration patterns fall within the historic range of variation to mimic natural disturbance patterns.

Initially, aspen regeneration areas may be too large an opening for suitable goshawk habitat, but once stocking is fulfilled and suitable for goshawk use (approximately 15 years), the treated areas will return to suitable habitat. The snag retention and use of irregular shaped, feathered edges, and group retention of live trees may provide sufficient cover to maintain usable habitat in the harvest areas. Mosaic burn patterns may also retain sufficient cover to maintain habitat. These treatments would provide long term sustainability of aspen, considered desirable for certain goshawk prey.

Forest Land Suitability

Under this alternative, only lands suitable for timber production would be harvested. Mitigation measures would provide protection of these sites as well as other proposed treatments for long term productivity. Therefore there would be no effect.

Old Growth

Treatments in the pinyon/juniper and aspen would have an effect on future old growth. The initial effect on the PJ stands, would be retention of current old growth habitat. Treatment would occur in stands not currently rated as old growth. The benefit of this treatment approach is to create a more heterogenous landscape which is less susceptible to catastrophic stand replacement fire, including the loss of existing old growth. In the long term (250-300 yrs), these treated stands may serve as replacement old growth stands and ensure a more continued presence of old growth habitat over time.

Approximately 512 acres of existing ponderosa pine old growth would be treated with low intensity surface fire to reduce ground and ladder fuels, as well as replicating the natural role of fire. This treatment has been recommended (Covington and Sackett, 1986, 1990, Covington and Moore 1994 and 1994, Kolb et al, 1994) to enhance stand conditions favorable to old growth.

Some mortality may occur but would not be at levels which would eliminate a stand from qualifying as old growth. Past experience with underburning in ponderosa pine in areas such as Stump Springs demonstrates less than 5% tree mortality favoring trees in the low to middle size classes. Creation of snags would improve the quality of the old growth.

There will not be mixed conifer old growth proposed for underburning. These stands are in remote locations and in need of mechanical treatment to reduce stocking levels prior to prescribed fire initiation. These stands would benefit from reduction in risk to catastrophic fire throughout the project area, thereby increasing the ability to suppress fires into the old growth.

Scheduled aspen regeneration treatments would reduce existing old growth by 367 acres to 1,042, or 31% of the aspen within the project area. The long term effect would be that these regenerated stands could provide future old growth in 100 years, thereby ensuring future stability of the aspen type.

In the short term, existing old growth habitat could be reduced by up to 367 acres, reducing the total to 8,011 acres. Old Growth would be reduced to 24% of the project area, or 29% of the forested acres. The long term effect would result in greater stability of old growth through reduced risk to catastrophic losses, and the ability to sustain old growth over time.

Forest Plan Consistency

Under this alternative, all proposed treatments are consistent with the Land and Resource Management Plan for the Dixie National Forest. These treatments are designed to move the analysis area towards the Desired Future Condition as described in Chapter I.

4.4.1.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON VEGETATION

Forest Ecosystems

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). Most recent analysis, (LBS Vegetation Treatment Project), have emphasized developing vegetation diversity, stand composition, structural stages, and using uneven-aged management.

The greatest potential change in effects would be if a large stand destroying event such as fire spread throughout the area. Implementation of Alternative 2 would reduce the risk of catastrophic fire to the sub-watersheds by reducing accumulated ground and ladder fuels and develop greater stand structure and composition diversity. These changes are especially important to the cumulative effects areas since this area is also very similar to the project area, being very homogenous and susceptible to more intense fire than the normal historic range. These treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,947 - 13,597).

Ecosystem Health

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). More recent analysis, (LBS Vegetation Treatment Project), have emphasized developing vegetation diversity, stand composition, structural stages, and using uneven-aged management.

Implementation of the Alternative 2 would improve the ecosystem health at this scale given the extent of proposed treatments which will reduce stand densities, decrease shade tolerant species, reduce forest floor fuel accumulations, and maintain certain key ecosystems (oak, seral species dominated by mixed conifer, and aspen) . These changes would result in increasing the diversity of the sub-watersheds and decrease the destructive potential of wildfire eliminating the forest cover at the landscape scale. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,947 - 13,597).

Stand Health

The area of analysis for the cumulative effects would be the Sand Creek and Bear Creek sub-watershed. As the potential for insect/disease activity increases, the risk to adjacent stands increases. Stands with highest density levels and/or age classes could provide a source for infection or infestation into surrounding areas. An example would be dwarf mistletoe infection centers could provide sufficient beetle susceptible trees to build-up populations which then fly into adjacent stands. An additional threat is these mortality centers providing snags/fuel for wildfire which carries into surrounding stands (Knight, 1987). Implementation of the proposed treatments would create greater

diversity of stand densities, structure and composition closer to the historic ranges. Greater stability within these ecosystems would decrease levels of insects and diseases at both the project and sub-watershed levels. Therefore these treatments would have the net effect of improving the cumulative effects area by the overall acres treated, (12,947 - 13,597).

Productivity

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs) More recent analysis, (LBS Vegetation Treatment Project), have emphasized developing stand and tree growth on seral species, long rotations, and use of uneven-aged management.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area resulting in widespread mortality and hence under utilize site productivity. Implementation of the proposed treatments would reduce the risk of such mortality both within the project and sub-watershed scales. Productivity would be shifter to seral species, which are more capable of attaining the larger sizes (ponderosa pine and Douglas-fir). Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,947 - 13,597).

Vegetative Structural Stage Distribution

The area of influence for the cumulative effects analysis is the project area divided into the various goshawk management areas for the three nest areas located within the project area (project file, vegetation). Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands as well as regeneration of aspen, with the intent to develop stands towards northern goshawk habitat (LBS Vegetation Treatment Project, Chapter 4, pages 31-32) . These activities were designed to improve existing conditions towards the desired future condition for northern goshawk, by emphasizing a younger age class of seral pioneer species. Implementation of these activities as well as those proposed under this project will lead to further enhancement of vegetation conditions for future goshawk habitat.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area. Implementation of the proposed treatments would reverse this trend by lowering stand densities, reducing shade tolerant species, introducing fire as a disturbance, and enhancing stand structure and composition diversity. Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,947 - 13,597).

Forest Land Suitability

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests, being planned prior to the LRMP, did not classify lands for timber suitability. These timber sales incorporated forestry practices which maintained soil productivity. More recent analysis, (LBS Vegetation Treatment Project), have identified suitability lands, harvesting only those lands suitable for timber harvest Existing and future projects would comply with suitability requirements. Therefore there would not be any change on land suitability.

Old Growth

The following table summarizes the cumulative effects by drainage, considering the implementation of the Proposed Action as well as LBS Vegetation.

Table 4.4.1 Old Growth by Drainage

Drainage	Total acres	Existing O. Growth ac.	% Existing Old Growth	Predicted Old Growth ac.	Predicted% Old Growth
Big Hollow	3,872	2,258	58	2,258	58
Dry Hollow	735	19	3	19	3
Pretty Tree	1,535	425	28	425	28
Side Hollow	3,038	245	8	245	8
Lake Creek	14,845	4,243	29	4,037	27
Bear Creek	8,030	1,381	17	1,144	14
Upper Sand Creek	14,582	2,678	18	2,678	18
West Fork Boulder	14,917	1,298	9	1,298	9
Middle Boulder Creek	3,393	362	11	338	10
Total	64,947	12,909	20	12,442	19

Implementation of the LBS Vegetation project would reduce old growth habitat within the Lake Creek drainage by 100 acres of pinyon/juniper, resulting in 4,037 acres of old growth or 27%. With the exception of Dry Hollow, each drainage meets or exceeds the forest plan standard for old growth. No treatment activities are planned within the Dry Hollow old growth.

Implementation of the proposed actions would not only provide for maintaining adequate existing old growth habitat, but would provide for a rotation of future old growth through creating different stages of stand development throughout the project area and hence the cumulative effects area, which is very similar to the project area. The risk to catastrophic or stand replacement fire within the cumulative effects area would be reduced. Therefore these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,947 - 13,597).

4.4.1.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be a loss in vegetation cover associated with harvest and prescribed fire treatments. Implementation of harvest and prescribed fire treatments would reduce existing old growth in the pinyon/juniper and aspen old growth by 367 acres.

Short Term vs. Long Term Productivity - The Proposed Action includes timber harvest, thinning, and prescribed fire activities which result in short term (less than 10 years) effects as described in this section. The design of these treatments includes maintenance or enhancement of long term productivity. In addition, the silvicultural prescriptions and effects will be monitored (Appendix 1) to assure that standards for long-term productivity are met.

Irreversible/Irretrievable Commitments - Ground disturbance associated with logging practices and prescribed fire would result in loss of existing vegetation. For skid trails and landings, vegetation is restored on the disturbed areas, but the type of vegetation may be changed from timber to grasses and legumes if these areas are to be part of the permanent transportation system. Revegetation of prescribed fire treatments are designed to utilize as much natural regeneration as possible, with unacceptable areas planned for seeding. Succession of vegetation types (sagebrush to pinyon/juniper), tree species (aspen to conifer), reduction of tree or stand growth, ecosystem diversity, old growth aspen would be reduced by the total acres treated, 9,671-9871, as compared to the No Action, but not eliminated.

These losses would be irretrievable but not irreversible.

4.4.2 EFFECTS OF ALTERNATIVE 2 ON RECREATION

4.4.2.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON RECREATION

The direct and indirect effects of implementing Alternative 2 on the recreation resource would be the same as those described for the Proposed Action with the following exceptions.

Off Highway Vehicle (OHV) Use

Implementation of Alternative 2 would reduce the miles of road and trails open to OHV use to 47.1. In addition, closing of the Road Draw Road would eliminate the OHV loop proposed to traverse around Haws Pasture.

4.4.2.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON RECREATION

The cumulative effects of implementing Alternative 2 on the recreation resource would be the same as those described for the Proposed Action.

4.4.2.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Implementation of Alternative 2 would not result in any irretrievable or irreversible commitment of the resource. The decision(s) to reduce the miles of road open to motorized travel, which directly affects some recreation pursuits such as OHV use, is not irreversible or irretrievable and could be reversed with a new analysis and decision.

4.4.2.4 EFFECTS OF ALTERNATIVE 2 ON WILDERNESS

Direct and Indirect Effects of Alternative 2 on Wilderness

The direct and indirect effects of implementing Alternative 2 on the wilderness are the same as those described for the Proposed Action.

Cumulative Effects of Alternative 2 on Wilderness

The cumulative effects of implementing Alternative 2 on the wilderness are the same as those described for the Proposed Action.

Other Effects Analysis Required by CEQ Regulations

Implementation of Alternative 2 would not result in an irretrievable or irreversible commitment of the wilderness resource. There are no management activities proposed adjacent to or in the Box-Death Hollow Wilderness Area.

4.4.3 EFFECTS OF ALTERNATIVE 2 ON ROADLESS/UNDEVELOPED RESOURCES

Introduction

This section describes the effects of Alternative 2 on the roadless/wilderness attributes of natural integrity/apparent naturalness, opportunities for solitude/primitive recreation, special features, and manageability/boundaries. Please refer to Section 4.2.3 for a complete discussion of the analysis methods to be used and to view a table summarizing effects.

4.4.3.1 EFFECTS OF ALTERNATIVE 2 ON IRAS

DIRECT AND INDIRECT EFFECTS

Boulder Mountain/Boulder Top/Deer Lake IRA (No.07040)

Summary of Development

Alternative 2 would result in no development of the Boulder Mountain/Boulder Top/Deer Lake IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct an aspen burn only operation in 131 acres of the total 243 acres of Boulder Mountain/Boulder Top/Deer Lake IRA falling within the Pretty Tree Bench analysis area. Since the prescribed fire would replicate a natural process, there would be no effect on the natural integrity and apparent naturalness. The treated acres would still meet the definition of undeveloped lands.

Solitude and Primitive Recreation
There would be a short term effect on the ability of users to experience solitude because of the presence of workers. This would affect users only during the activity period. With closure of the Road Draw Road and the resultant reduction of sound from OHV use in this area, there would be an increase in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The treatment of 131 acres would not have any effect on manageability. The roadless portion of the IRA would remain at 111,182 acres.

McGath Lake/Auger Hole IRA (No.070034)

Summary of Development

Alternative 2 would result in no development of the McGath Lake/Auger Hole IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would burn 9 acres of ponderosa pine out of the total 32 acres presently roadless within the analysis area. Since the prescribed fire would replicate a natural process, there would be no effect on the natural integrity and apparent naturalness of the 117 acre portion of the McGath Lake/Auger Hole IRA that falls within the Pretty Tree analysis area.

Solitude and Primitive Recreation
There would be a very short term effect on the ability of users to experience solitude during the actual burn due to the presence of workers. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years. With closure of the Road Draw Road and the probable increase of sound from OHV use in this area, there would be an decrease in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 2 would have no effect on the manageability/boundaries of the McGath Lake/Auger Hole IRA. The roadless portion of the IRA would remain 8,328 acres.

Box-Death Hollow IRA (No.07033)

Summary of Development

Alternative 2 would result in no development of the Box-Death Hollow IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct a burn only operation of 51 acres of pinyon-juniper and 16 acres of sagebrush in the 1,098 roadless acres of the Box-Death Hollow IRA falling within the Pretty Tree analysis area. Since the prescribed fire would replicate a natural process, there would be no effect on the natural integrity and apparent naturalness of the IRA.

Solitude and Primitive Recreation
There would be short term effects on the ability of users to experience solitude because of the presence of workers. This would affect users only during the activity period. With closure of the Road Draw Road and the probable increase of sound from OHV use in this area, there would be an decrease in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 2 would have no effect on the manageability/boundaries of the Box-Death Hollow IRA. The roadless portion of the IRA would remain 3,177 acres (including the 2,079 acre Antone Bench parcel within the Box-Death Hollow Wilderness Area.

New Home Bench IRA (No.07035)

Summary of Development

Alternative 2 would result in no development of the New Home Bench IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct a burn only treatment in 29 acres of ponderosa pine, 59 acres of mixed conifer, 148 acres of oak, 151 acres of pinyon-juniper, and 14 acres of sagebrush. All five burn treatments totaling 401 acres would appear as a natural process to most viewers and would leave no evidence of human activity. As a result, there would be no effect on the natural integrity and apparent naturalness of the IRA and all of the area would continue to meet the definition of undeveloped lands.

Solitude and Primitive Recreation
With the burn operations, there would be short term effects on the ability of users to experience solitude because of the presence of workers. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine, mixed conifer and oak treatments. With closure of the Road Draw Road and the probable increase of sound from OHV use in this area, there would be an decrease in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 2 would have no effect on the manageability/boundaries of the New Home Bench IRA. The roadless portion of the IRA would remain at 6,000 acres. However, if acreages from the adjacent Undeveloped/unroaded Areas No. 3 and 4 were ever combined with the IRA, it would then have more manageable boundaries consisting of FR 153, Utah State Highway 12 and Boulder Creek. The expanded IRA would then contain 11,461 acres.

4.4.3.2 EFFECTS OF ALTERNATIVE 2 ON OTHER UNDEVELOPED/UNROADED AREAS

DIRECT AND INDIRECT EFFECTS

Undeveloped/Unroaded Area No. 1 (1,764 acres)

Summary of Development

Alternative 2 would treat a total of 673 acres, none of which would result in the development of presently undeveloped/unroaded lands. Congress would still have the opportunity to consider all 1,764 acres of the Area for inclusion into the National Wilderness Preservation System. This is because the acreage aggregates with other undeveloped lands to the north and northwest to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected mainly by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct burn only treatments in 160 acres of ponderosa pine and in 513 acres of aspen. Both burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. Neither of these activities would have any effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds associated with workers and equipment. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine treatment. This would affect users only during the activity period. With closure of the Road Draw Road and the resultant reduction of sound from OHV use in this area, there would be an increase in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
All 1,764 acres of Undeveloped/Unroaded Area No. 1 could be combined with the Boulder Mountain/Boulder Top/Deer Lake IRA and other undeveloped/unroaded lands to the northwest. If

this were to happen, the manageability of the Area would be improved because the IRA would then have Road Draw and private land (Haws Pasture) as a southern and southeastern terminus respectively.

Undeveloped/Unroaded Area No. 2 (2,868 acres)

Summary of Development

Alternative 2 would result in no development of the Undeveloped/Unroaded Area No. 2 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,868 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct burn only treatments in 59 acres of ponderosa pine, and in 175 acres of oak. These burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. Alternative 2 would also conduct burn treatments in 38 acres of pinyon-juniper, and in 93 acres of sagebrush. These burns would require the cutting of pinyon and juniper to carry the fire and it is expected that most of the felled wood would be consumed. No treatments in the Area would have long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine and oak burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine and oak treatments. With closure of the Road Draw Road and the probable increase of sound from OHV use in this area, there would be an decrease in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 2,868 acres of Undeveloped/Unroaded Area No. 2 would offer the possibility of being combined with the Box-Death Hollow Wilderness Area at some future date. If this were to happen, the wilderness area would gain a more generally identifiable boundary with FR 153 along its northeast border. However, a 152 acre island of private land would detract from the effectiveness of this proposition.

Undeveloped/Unroaded Area No. 3 (3,371 acres)

Summary of Development

Alternative 2 would result in no development of the Undeveloped/Unroaded Area No. 3 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 3,371 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct burn only treatments in 26 acres of ponderosa pine and in 33 acres of sagebrush. Both burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. Neither of these activities would have any effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With these burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds workers and equipment. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine treatment. With closure of the Road Draw Road and the probable increase of sound from OHV use in this area, there would be an decrease in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 3,371 acre Undeveloped/Unroaded Area No. 3 would offer the possibility of being combined with the 6,000 acre New Home Bench IRA and the 2,090 acre Undeveloped/Unroaded Area No. 4 . If this were to happen, the 11,461 acre IRA would gain a more easily identifiable boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

Undeveloped/Unroaded Area No. 4 (2,090 acres)

Summary of Development

Alternative 2 would result in no development of the Undeveloped/Unroaded Area No. 4 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,090 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 2 would conduct burn only treatments in 103 acres of pinyon-juniper, and in 33 acres of sagebrush. Both burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. Neither of these activities would have any effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With these burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of workers and equipment. The period of interruption in any of the above treatments would be of short duration. With closure of the Road Draw Road and the probable increase of sound from OHV use in this area, there would be an decrease in the opportunity to experience solitude.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The 2,090 acre Undeveloped/Unroaded Area No. 4 would offer the opportunity of being combined with the 6,000 acre New Home Bench IRA and the 3,371 acre Undeveloped/Unroaded Area No. 3 . If this were to happen, the 11,461 acre IRA would gain a more easily identified boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

4.4.3.3 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON ROADLESS/UNDEVELOPED

Introduction

Cumulative effects will be divided into two sections: 1) Effects on IRAs and 2) Effects on undeveloped/unroaded lands.

Effects on IRAs

With implementation of Alternative 2, no acres would be developed in the four IRAs represented in the analysis area. The combined 133,192 roadless acres in those four IRAs and total of 305,806 roadless acres encompassed in the thirteen (13) IRAs in the CEA would remain as at present. The anticipated Donkey/Park Ridge Vegetation Project on the Teasdale District is a foreseeable future action that may develop several hundreds of acres of the Boulder Mountain/Boulder Top/Deer Lake IRA. Both the Final Roads Rule and the President's recent Roadless Initiative are foreseeable future actions that may affect the number of acres of roadless in the CEA. Based on known information, if Alternative 2 were to be implemented, it would not affect any roadless IRA lands.

Effects on Undeveloped/unroaded Lands

With implementation of Alternative 2, no acres would be developed in the four Undeveloped/ Unroaded Areas represented in the analysis area. There are no other known projects that would affect undeveloped/unroaded character within the CEA.

4.4.3.4 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Road building and associated maintenance in a roadless/undeveloped area is an irreversible commitment of the resource to a developed condition for the long-term. Alternative 2 would have no irreversible or irretrievable effects on these resources.

4.4.4 EFFECTS OF ALTERNATIVE 2 ON VISUAL QUALITY

Effects on Visual Quality by the various actions is measured by the amount of visual changes that would take place and their duration. Achieving long-term visual quality goals in a forest environment is a dynamic process. Vegetative treatments sometimes cause temporary periods of unacceptable visual changes, therefore it is important to plan actions so that an attractive sequence of views is maintained and Visual Quality Objectives (VQO's) are met.

The following discussion of Alternative 2 will describe expected changes in the visual landscape within the Pretty Tree analysis area viewshed. It will be discussed in terms of the effects on the visual elements (form, line, color and texture) expected.

4.4.4.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON VISUAL QUALITY

Guidance for this section is found in the Visual Management System, Agriculture Handbook No. 462, NFLM, Vol. 2. Alternative 2 would treat between 9,676 and 9,876 acres of the 33,929 acre analysis area. The effect would be greater diversity in vegetation species, size, color, texture and vigor.

Visual Quality Objectives (VQO's)

The effects of the activities proposed with this alternative would meet the VQO's as described in the Proposed Action (Section 4.2.4.1). The closure of Road Draw Road and the stem road going south with the associated loss of the OHV loop would have the effect of changing the VQO from partial retention to modification.

Landscape Character

Alternative 2 would cause both short-term and long-term changes in landscape character in the analysis area. The character of the stands would change to a more open condition. The forest would be less compact and less dark with removal of some of the overstory and would display greater visual variety. This visual condition would be stable as the vegetation treatment would have reduced the chances of a major insect or fire disturbance.

Dominance Elements

As previously indicated, dominance elements are the simplest visual recognition parts which make up the characteristic landscape. Alternative 2 is discussed below in terms of changes in form, line, color and texture which would occur.

Form: This visual element is usually dominant because of the vast scale involved. Examples in the project area are the rocky ridges and the steep Sand Creek drainage basin. Alternative 2 would have no effect on the land and water forms of the project area.

Line: Live trees and snags provide important vertical line values to the forest landscape. In other instances, horizontal lines such as those made by a road bed, road cuts or fills present an unnatural contrast with the forest floor. With Alternative 2, the verticality of some trees would be roughly comparable to the Proposed Action. Any existing road scars currently visible in the middleground of FR #153 would remain visible. After one or two growing seasons, proposed skid trail systems would be more natural in appearance but may not be fully integrated into the landscape until regeneration has occurred for a 5-10 year period.

Color: Overall, the color variety in the landscape would be increased with Alternative 2, but not to the degree that would occur with the Proposed Action. In the short-term, disturbances created by the proposed vegetation treatments would result in more earth browns and burnt blacks showing. After one or two growing seasons, reseeded and naturally regenerated grasses and forbs would restore the yellow/green colors that would contrast pleasingly with the light aspen greens and the darker greens of the conifers. The grayish brown color of snags would continue to contrast with the dark green conifers and the grayish white trunks, spring greens and fall yellows of the aspen would increase as they proliferate due to patchcuts and burns. Any white sawed log ends and black partially burned slash originating from this action would be removed from Sensitivity 1 road and trail Foreground zones. The creation of large bare brown soil areas from the construction of landings and skid trails would reduce visual quality in the short term. These effects would be unnoticed after one or two growing seasons. The riparian areas would continue to display the present variety of colors.

For trail users, there would be a short-term visual impact since they are traveling at a slow pace and since some trails pass alongside proposed aspen burn units. The opportunity of observing what may be unacceptable visual disturbances to some would be increased until the blackened areas were covered again with new growth. In trail Foreground zones, the mitigating measures stated in Chapter 2 would be applied to keep and/or bring impacts within the parameters needed to meet the appropriate VQO's.

Texture: Under Alternative 2, the overall vegetative texture would become more coarse, but not to the degree that would occur with the Proposed Action. Any future openings in the more open forest landscape would be less noticeable than at present. Proposed treatments would promote greater irregularity in canopies increasing textural variety in both the short and long term.

Compliance with VQO'S

The desired VQO's would not always be met within the foreground and middleground of primary roads and trails in the analysis area because of debris left from previous sales or treatment activities. Under Alternative 2, however, many of these areas would be brought closer to the required VQO, due to burning activities which would reduce slash and residue from past actions.

Desired Future Condition

Alternative 2 does not conflict with the LRMP. The Plan allows timber harvest in the affected management areas and specifies enhancing visual quality. This action would move the project area toward the desired future condition of increased visual variety through the various treatments.

4.4.4.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON VISUAL QUALITY

With this alternative, the analysis area would become more visually attractive to recreationists. There would be no cumulative visual effects from other nearby vegetation treatment projects such as LBS. If the Hell's Backbone Road is someday officially designated as a national scenic backway, an increase in visitor use would occur, possibly accompanied by an increase in site degradation.

Other cumulative effects on the visual resource would be those actions that may occur on private land.

4.4.4.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

With Alternative 2, events such as major wildfires and/or other disturbances would less likely change the visual setting. The extent of alteration would depend on the event itself.

No irreversible or irretrievable effects would occur to visual quality as a result of Alternative 2. Because vegetation grows back over time, timber harvesting and other proposed treatments would not cause any irreversible impacts. Natural processes such as fire, wind, drought, and natural succession would continue.

4.4.5 EFFECTS OF ALTERNATIVE 2 ON SOILS

4.4.5.1 DIRECT AND INDIRECT EFFECT OF THE ALTERNATIVE 2 ON SOILS

A soil erosion model was used to calculate on-site (treatment areas) soil erosion for each soil under treated conditions for each of the action alternatives compared to the current erosion rates of the no-action alternative using procedures outlined in the publication Estimating Soil Erosion Losses From Utah Watersheds (Tew, 1973).

During the environmental analysis a critical soils area map, included in the project file, was developed which identified all the areas that would have a possible impact on the soil and water resources. Specific mitigation (soil and water conservation practices) were developed to either avoid completely or to minimize the potential damage to these resources (see also Map L, App. 3).

All soils proposed for treatment were evaluated from the standpoint of soil erosion relative to soil loss tolerance thresholds (T values).

Logging harvest can damage the soil resource and decrease long term productivity of the soil. The major impacts are typically caused by soil compaction, surface disturbance, and fire effects. A goal when implementing management activities if is to protect long-term soil productivity and soil hydrologic function. On timber sales detrimental effect is defined as 15% reduction in inherent soil productivity potential (FSH 2509.18). The desired future condition following logging activities is that long term soil productivity and hydrologic function will be maintained on as many acres as possible, but at least 85% of the activity area. From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document. (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) SWCP's are implemented as timber sale contract provisions in timber sales (SWCP 14.01) and soil considerations in prescribe burn planning (SWCP 18.02). As part of the NEPA process, soils suitability was determined for tractor logging (SWCP 14.07), and unstable areas are excluded from timber sales (SWCP 14.05). During logging activities, sale area

maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP 14.06). Log landings and skid trails are designated by the sale administrator (SWCP 14.08, SWCP 14.10) and actions are taken to control erosion during operations and before sale closure (SWCP 14.11-14.15, 14.18, 14.19). Logging is suspended when wet conditions may cause soil damage (SWCP 13.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996).

Fire has the potential to affect soils by consuming soil organic matter, altering the physical characteristics and increasing the solar energy absorbed by blackening the soil. Any of these may alter infiltration and erosion rates. However, none of the direct effects are likely to decrease the long term productivity if fire intensities and temperatures are kept low (Bayer, 1996). To ensure no detrimental effect to the soil resource in the project area, soil suitability was determined and unsuitable areas were excluded from logging and fire. Soils and vegetation information was used to exclude areas from burning and define precautions in others (see Map L, App. 3). Soil and watershed considerations are used in prescribe burn planning (SWCP 18.02, SWCP 18.03). Standards and guidelines defined in the Forest Plan will be implemented during logging and burning to ensure soil quality standards are met. Burning will be done when conditions will limit the intensity of the fire, and when burning in large blocks the pattern will be mosaic (not continuous). Logging will include designation of skid trails and endlining, and will be done only when soil moisture conditions are suitable. Where detrimental effects to soil has occurred, either by soil disturbance, compaction or fire intensity, erosion control measures will be implemented. These include seeding disturbed areas, waterbarring skid trails, landings and roads, and scarifying (if necessary) and seeding areas where fire has exposed mineral soil. Monitoring on the Dixie National Forest has shown that when these measures are taken direct, indirect, and cumulative effects are within Soil Quality Standards, and long term productivity is maintained (Bayer, 1996). From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document . (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) SWCP's are implemented as timber sale contract provisions in timber sales (SWCP 14.01) and soil considerations in prescribe burn planning (SWCP 18.02). As part of the NEPA process, soils suitability was determined for tractor logging (SWCP 14.07), and unstable areas are excluded from timber sales (SWCP 14.05). During logging activities, sale area maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP 14.06). Log landings and skid trails are designated by the sale administrator (SWCP 14.08, SWCP 14.10) and actions are taken to control erosion during operations and before sale closure (SWCP 14.11-14.15, 14.18, 14.19). Logging is suspended when wet conditions may cause soil damage (SWCP 13.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996) (Bayer, 1997).

Proposed treatment areas occur on following soils:

Aspen harvest (and Aspen harvest and burn) - soil map units 528, 538, 539 and 545
Aspen maintenance - soil map units 523, 538, 539, and 545
Aspen burn - soil map units 539, 543, and 545
Mixed conifer burn - soil map units 523, 534, and 545
Oak burn - soil map units 523, 532, and 545
Pinyon/juniper burn - soil map units 429, 432, 524, 529, and 532
Ponderosa Pine Burn - soil map units 523, 532, 534, 538, and 545
Sage Burn - soil map units 432, 441, 477, and 524

On-Site Soil Erosion

Soil disturbance associated with tractor logging and the loss of canopy and ground cover in the burned areas will result in an unavoidable short term increase in on-site soil erosion. All treated areas will be within soil loss tolerance thresholds, even during the first year when erosion will be greatest (see table, section 4.2.5.1). The recommended mitigations as well as the relatively low percentage of watershed area harvested would ensure that the likelihood of increases in sediment to streams due to treatment will not be measurable (see section 4.4.6). The treatment areas proposed for burning will not result in soil disturbance, but will experience loss of ground cover and canopy cover which will result in some increase in on-site erosion. Resprouting in the aspen, pine, mixed conifer, and oak types should result in good ground cover within one to two years; recovery in other vegetation types will take longer. None of the proposed burned treatment areas should result in severely burned soil conditions; if burn areas require, scarifying and seeding will be done to limit soil erosion.

Current erosion rates from the proposed treatment areas average .40 tons/ac/yr. Estimated erosion rates the first year following treatment are .74 tons/ac/yr. Erosion rates will decrease substantially each year thereafter. These erosion rates (both pre and post treatment are very low compared to the allowable 3 to 5 tons/ac/yr (soil loss tolerance threshold needed to maintain long term soil productivity).

Long Term Soil Productivity

Where prescribed burning is done, a loss of most of the fine ground fuels will occur, resulting in a release of nutrients held in those fuels. Fire associated with the proposal should result in leaving a sufficient amount of the larger fuels (large woody debris) for long term nutrient cycling to maintain soil productivity.

Harvest using mechanical equipment will occur only in aspen stands where soils are suitable for timber sales (SWCP 14.07). Compaction and displacement associated with timber harvest in the aspen will be restricted, and primarily to the designated skid trail system (utilizing old skid trails from previous harvesting wherever feasible). This mitigation will meet soil quality standards for long term soil productivity.

Use of native seed

Alternative 2 specifies the use of native seed exclusively. Native seed is generally expected to establish ground cover at a slower rate than seed grown specifically for other purposes such as erosion control. It is also expected that on certain sites such as steep slopes, the risk of failure is higher. When native seed is established successfully, soil erosion rates are expected to be higher during the short term, however log term soil productivity is expected to be maintained when ground cover is established.

Forest Plan Consistency

This Proposed Action is consistent with the Land and Resources Management Plan of the Dixie National Forest would reduce the risk of high intensity fire effects on the soil resource due to catastrophic fire.

4.4.5.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON SOILS

The cumulative effects analysis area for long term soil productivity and on-site soil erosion is the

project area itself. The intent is to ensure that proposed management on a project area does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past management activities, the proposed management activity, and foreseeable future management activities. Off-site impacts of sediment are discussed in the hydrology section of the NEPA document. Long term soil productivity is not affected by adjacent projects. Cumulative impacts to soil productivity are the result of additional projects on the same piece of ground, i.e. additional soil erosion, increased compaction, displacement, etc.

Soil quality standards include threshold values for amount of surface organic matter, soil erosion rate and amount of soil disturbance (Bayer 1996). Increased on-site soil erosion rates associated with timber harvest are typically expected to be near natural levels (Bayer 1996). Direct, indirect and cumulative effects from past and ongoing activities are within soils quality standards, and long term productivity is maintained, when unsuitable soils are excluded of from management activities and mitigation measures are applied to offset impacts (Bayer 1996). Unsuitable soils have been excluded through the planning process (LBS Vegetation Treatment Project), and mitigations have been implemented through prescribe burn and timber sale planning and administration.

Previous projects on any of the proposed treatment areas are timber harvests of approximately 10 years ago more recently and prescribe burn activities under the LBS Vegetation Treatment Project. Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management harvest systems were used within most of the ponderosa pine. The timber harvests used a relatively high concentration of skid trails and logging roads. The Affected Environment, Soils section states that under current conditions none of the areas proposed for treatment exceed soil quality standards. Ongoing LBS Vegetation Treatment Projects include pinyon juniper prescribe burning along Hells Backbone Road and aspen harvest in the Road 566 area. Past and present management activities in the Project Area include road maintenance, livestock grazing, fuelwood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, trail riding with mountain bikes and Off Highway Vehicles (OHV's).

Other current management activities that are occurring within the Analysis Area include livestock grazing and dispersed recreational use (hunting, camping, fishing). The proposed mitigation of restricting skidders to skid trails, endlining, and restricting logging when soils are too moist, should result in acceptable cumulative impacts to the soil resource (i.e., minimize increase in compaction, displacement, puddling). As described above, there should be sufficient large woody debris left on site following treatment for long term nutrient cycling which will maintain soil productivity.

Foreseeable future management activities within the Analysis Area include LBS Vegetation Management Project and Sand Creek Soil Stabilization Project. The on-going Sand Creek Soil Stabilization Project is rehabilitating and reconstructing, and closing roads in the Sand Creek watershed that were eroding and/or contributing sediment to streams due to improper location, lack of maintenance and/or lack of proper drainage. The project also incudes rehabilitation of gully systems in the vicinity of sand and Grimes Creek. The project has improved site productivity and reduced sediment delivery from gullied areas to Sand Creek.

4.4.5.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - there will be short term unavoidable increase in on-site soil erosion.

Short Term vs. Long Term Productivity - Burning will result in a release of nutrients immediately

following the fire. There should be sufficient large woody debris left on site for long term nutrient cycling.

Irreversible/Irretrievable Commitments - There should be no irreversible commitments to the soil resource. The portions of the treatment areas dedicated to permanent skid trails and landings are an irretrievable resource commitment (timber production is lost from these areas so long as they remain part of the transportation system servicing the area).

4.4.6 EFFECTS OF ALTERNATIVE 2 ON WATERSHED

4.4.6.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON WATERSHED

If Alternative 2 is implemented, the transportation and vegetative management activities summarized in Chapter 2 would be implemented. Transportation management would be implemented to close roads within the project area which are no longer necessary for administrative use. Seasonal closure would also be implemented on many roads within the project area. An OHV loop would be developed from the trailhead at the end of Road 566 around Haw's pasture and back through Road Draw road. Also included are actions included in section 4.2.6.1 under the heading, "Actions Common to all Action Alternatives" (where applicable). An area closure which would prohibit vehicular travel off of roadways and designated trails would also be implemented.

Water Quantity and Streamflow Regime

Trees have a direct influence over the amount of precipitation input available for stream flow because they transpire water, intercept precipitation which is then evaporated or sublimated directly back into the atmosphere, and modify the understory evapotranspiration environment (Kaufmann et. al, 1987). Any factor that reduces basal area or Leaf Area Index (LAI) of the forest will increase runoff to some degree (Shepperd et. al, 1991). Following fire or harvest, loss of ground cover and change in vegetation type (such as proposed in aspen or pinyon/juniper stands) will cause changes in infiltration and runoff. In aspen stands, where the objective of harvest and prescribed burning is to kill all the trees, the fire will also result in lower transpiration rates, especially during 3 years following the burn, but also in the longer term (Gifford, 1983). Where conifer has been killed in favor of deciduous trees (such as in aspen maintenance areas), more solar radiation will reach the snow surface and a more rapid snowmelt is expected (Dunne and Leopold, 1978), and transpiration will decrease (Gifford, 1983).

These changes may or may not increase streamflow or timing of streamflows, depending on treatment site locations and natural variations in precipitation, snowpack and rate of snowmelt. Streamflow changes also depend on the percentage of watershed area treated and watershed characteristics (Kendall, 4/1997). Studies on the effects of burning on water yield have been done mostly on high intensity fires, and information on moderate or low intensity fires is scarce. Applying the analogy of a burn as a vegetative removal, studies of vegetative removal may be used to predict loss of vegetation due to fire. Considering only vegetative removal, it has generally been noted that 20% to 30% of a watershed must be harvested before a significant change in flow can be noted (Troendle, 1982). A watershed experiment in northern Utah which harvested 13% of the watershed using aspen clearcut showed no measurable increase in water yield (Johnston, 1984). A review of 94 catchment experiments concluded that when vegetative cover is removed, all but 1 resulted in an increase in water yield, however results were not consistent regarding that amount of the increase, length of treatment effect, or the effect on stream flow and timing or peak flows (Bosch and Hewlett, 1982).

In areas where tree cutting and prescribed fire which kills trees (see summary table, section 4.2.6.1), water yield is expected to increase. Burning which removes vegetation, and harvest, would reduce canopy closure and basal area. A decreased basal area would result in local increased water yield and may result in a small increase in runoff from the affected areas (Johnston, 1984, Troendle, 1982). Summer time evapotranspiration is influenced by forest type and structure (Troendle, 1982). At the watershed scale Alternative 2 would maintain present forest type and structural characteristics (summary table documents that less than 9% of the affected watersheds will undergo a vegetative change during the time span of the project). Vegetation in lower elevations (primarily P-J stands) utilize summer precipitation and stored water in the soil, and causes a depletion of excess soil water during the summer months (as evidence by the lack of springs, see app 3, map M). Following aspen treatment there is not expected to be a surplus of water available from harvest areas during summer months (Johnston, 1984). Therefore, the majority of the water yield increase from the project area would be during spring runoff, and would not be discernible from larger, natural variations (Troendle, 1982) (Johnston, 1984).

Water Quality

Burn Activities

The Environmental Consequences, Soils section predicts that prescribed burning on the proposed treatment areas will result in a loss of most of the fine fuels while leaving sufficient larger fuels required for nutrient cycling. Burning will not result in any direct soil disturbance, but will cause loss of ground cover and canopy cover, resulting in an increase in on-site erosion. This increase would be well within soil loss tolerance thresholds (see section **4.2.5**). Following fire, erosion rates within burn areas will increase but long term elevated erosion rates are not expected (USDA Forest Service 1981, Elliot 1998). The amount of increase is extremely variable and is a function of the intensity of burn, slope, and proximity to streams. Water quality degradation may result from excessive amounts of nutrients, sediment or detritus (Kendall, 1/1997), and water quality standards may be exceeded in short term due to storm runoff. These effects will be minimized by conducting burn in accordance with burn plans (SWCP 18.02) and applying mitigations as part of the project plan (see Chapter 2, Mitigations section). Watershed monitoring on the Dixie National Forest has indicated that when prescribe burning is done within burn parameters, no short term adverse effects to hydrologic function and short term soil loss is minimal (Dixie National Forest, 1997; Dixie National Forest, 1998). Included in mitigations are the use of no burn areas (buffers) to limit sediment delivery to stream wetlands and riparian areas. Buffers, or Streamside Management Areas (SMAs), are widely recognized to be highly beneficial to water quality and aquatic habitat (EPA, 1993). Vegetation in SMAs reduces runoff and traps sediments generated from upslope activities, and reduces runoff before it reaches surface waters (same reference).

Harvest Activities

A summary of forest management practices from nation-wide studies shows that forest practices have the potential to degrade the quality of water in streams by altering temperature, lowering dissolved oxygen concentrations, and increasing the concentration of nitrate-N and suspended sediment. In most cases, retention of buffer strips keeps the maximum increase in stream temperature to less than 2 degrees Centigrade. Depletion of streamwater oxygen is also rare in current harvesting operations. Minimizing inputs of fine organic debris into streams prevents creation of high biological oxygen demand. Nitrate concentrations may be increased by forest harvesting, but the summary concluded that harvesting does not degrade water quality by increasing nitrate concentrations in streamwater, with the possible exception of the Hubbard Brook forests (northern hardwood forests).

The summary concluded that the major concern associated with silvicultural practices is suspended sediments. In this study it was concluded that use of Best Management Practices generally minimizes suspended sediment concentrations (Brinkley and Brown, 1993).

State of Utah, Best Management Practices applied to the harvest operations will be in the form of Soil and Water Conservation Practices (SWCP's). Monitoring of past timber sales on the Dixie National Forest during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation (Dixie National Forest, 1995; Dixie National Forest, 1996; Dixie National Forest, 1997; Dixie National Forest, 1998). The State has determined that use of SWCP's is adequate mitigation to reduce sedimentation (USFS, 1993). SWCP's are applied with an emphasis on skidding operations. Specific contract requirements which implement SWCP's are included in the timber sale contract provisions. In addition to the SWCP's listed in the Soils Section 4.2.5, which are designed to protect the soil resource. Additional SCWPs are routinely incorporated into timber sales on the Dixie National Forest which are not identified as mitigations in this document to protect water resources. These include designating springs, perennial stream courses, wetlands and seeps and on the timber sale map (SWCP 14.03) for protection during the sale (SWCP 13.03, SWCP 14.17).

Transportation Management

Travel management activities, including road closures, are expected to have an overall favorable effect on water quality in the long term. During and following soil disturbing activities erosion rates can be expected to increase until disturbed areas are stabilized, typically 3-5 years (USDA Forest Service, 1981). Utilizing BMPs as previously described in this section, will ensure that impacts to water quality are minimized and in compliance with state an Federal water quality laws.

Closure of Road Draw Road, spur road in the Sweetwater Creek area, and the closure of the OHV trail, would have an overall favorable effect on water quality in the long term. During and following soil disturbing activities erosion rates can be expected to increase until disturbed areas are stabilized, typically 3-5 years (USDA Forest Service, 1981). Utilizing BMPs, previously described in this section 4.2.6.1 under "Action Common to all Action Alternatives" heading (where applicable), will ensure that impacts to water quality are minimized and in compliance with State an Federal water quality laws.

Considering the above discussion, it is not expected that beneficial uses of water will be impacted and the action is in compliance with State an Federal water quality laws.

Use of native seed

Alternative 2 specifies the use of native seed exclusively. Native seed is generally expected to establish ground cover at a slower rate than seed grown specifically for other purposes such as erosion control. It is also expected that on certain sites such as steep slopes, the risk of failure and therefore water quality impairment is higher. When native seed is established successfully, soil erosion rates are expected to be higher during the short term, however it is not expected to have any measurable effect of water quality.

Forest Plan Consistency

Alternative 2 is consistent with the LRMP of the Dixie National Forest, more specifically implementing the project will not violate watershed related Standards and Guidelines described Chapter IV of

the LRMP. Alternative 2, if implemented, would reduce the risk of cumulative watershed effects due to catastrophic fire.

4.4.6.2 CUMULATIVE EFFECTS OF THE ALTERNATIVE 2 ON WATERSHED

The cumulative effects area (CEA) for watershed analysis includes the drainages that receive water from within the Project Area, Sand Creek and Boulder Creek within National Forest Boundary. The CEA was chosen because of the natural boundaries of watershed resources. Flow from these drainages is used for culinary year round, and irrigation downstream during the months of May to October. During the remainder of the year this water flows into the Escalante River, then to the Colorado River.

Baseline cumulative effects analyses have been completed on the cumulative effects area using the Watershed Condition Rating (USDA 1993). Both Sand and Boulder Creeks are rated as good Watershed Condition Rating. The Watershed Condition Rating describes the relative condition (good, moderate, or poor) of the watershed, and provides some insight into the risk of cumulative effects (i.e. sedimentation, channel and aquatic habitat degradation, etc.) resulting from increased water yields, peak flows, and/or excessive erosion. The Watershed Condition Rating is based on road density and past vegetative disturbances (i.e. timber harvest, mortality, and fire).

Past and present management activities in the Project Area include road construction, road maintenance, timber harvest, livestock grazing, fuel wood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, and trail riding with mountain bikes and Off Highway Vehicles.

Recreation access to McGath Lake is via poor road locations that have steep grades and that are located through the center of wet meadows. Past management activities including terracing and seeding gully areas are evident. The Affected Environment, Soils section of this document identifies several existing conditions within the cumulative effects area, including inadequately maintained and poorly located roads, gullies, and a slump. These have been addressed in a NEPA analysis, Sand Creek Soil Stabilization Project.

Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management systems were used within most of the ponderosa pine. Timber harvest activities resulted in construction of skid trails and logging roads. The Affected Environment, Soils section state's that under current conditions, none of the areas proposed for treatment exceed any of the soil quality standards.

Water and sediment yield is expected to increase slightly due to harvest activities. The water yield increase would occur during spring runoff, are not expected to be measurable compared to natural variations (section 4.2.6.2). Increased sediment yield from project activities are not expected to contribute measurably to existing sources within the watershed (section 4.2.6.2). The proposed activities will not greatly affect the overall seral stage or roads density of the cumulative effects area (Sand and Boulder Creeks Watersheds), factors considered when determining the risk of cumulative watershed effects (USDA Forest Service, 1993). Considering these factors, it is unlikely that Alternative 2 will to cumulative watershed resource effects.

Monitoring of prescribed fire and past timber sales on the Dixie National Forest during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation (Dixie National Forest, 1995; Dixie National Forest, 1996; Dixie National Forest, 1997; Dixie National Forest, 1998). If erosion on disturbed sites is controlled or prevented, it is assumed

that water quality degradation, associated with sedimentation, will be prevented. Implementation of Alternative 2 will have no long term impact on the hydrologic function or water quality within the watershed. Proper implementation of SWCPs will minimize soil loss and prevent any potential impacts to downstream water quality (Kendall, 1/1997, Kendall, 4/1997).

4.4.7 EFFECTS OF ALTERNATIVE 2 ON FISHERIES

4.4.7.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON FISHERIES

This alternative would not adversely affect the fisheries. This alternative would have similar beneficial effects as described for the Proposed Action.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired watershed condition for fish habitat.

4.4.7.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON FISHERIES

This alternative would not result in adverse cumulative effects to fisheries. This alternative would have similar effects as the Proposed Action.

4.4.8 EFFECTS OF ALTERNATIVE 2 ON WILDLIFE

4.4.8.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON WILDLIFE

General Habitat Conditions

Implementation of this alternative would result in similar habitat effects as the Proposed Action with introduced disturbances to the principal habitats.

Within the **aspen habitat**, this alternative would provide the following habitat conditions:

- about 35% of the aspen habitat in a young age-class condition, (about 29% with high snag density; about 6% with low snag density.)
- about 13% of the aspen habitat to a relatively pure aspen stand of mature to old age class condition, and
- about 53% of the aspen habitat left in mature to old age-class with varying amount of encroaching conifers.

Roughly 1,000 acres of young age-class habitat conditions would be provided. Of the action alternatives, this alternative provides the least acreage of relatively pure aspen habitat condition and the highest acreage of mature aspen remaining in a condition with moderate to high density of conifer encroachment.

Within the **mixed conifer**, the **ponderosa pine**, the **sagebrush**, and the **oak habitats**, the acreage treated and the effects of this alternative would be the same as for the other action alternatives and as described for the Proposed Action. Within the **pinyon-juniper habitat**, the effects on treated acres would be similar as for the Proposed Action. Of the action alternatives, this alternative would treat

the fewest acres. The fewer pinyon-juniper acres treated by this alternative would result in fewer acres of restored sagebrush than the other action alternatives.

Open Road Density

This alternative would affect wildlife in two manners. The first would be a decrease in open-road density to 0.89 miles per square mile. This would result in less disturbance to wildlife within the analysis area as compared to the Proposed Action and the No Action alternative, due to additional road closures, including Road Draw.

Secondly, this alternative would increase the period of seasonal road and area closures in the Sand Creek drainage and the Sweetwater Creek drainage, by including all hunt periods, starting with bow hunting in August and ending after the last turkey hunt in late May. The area closure would not apply to over-the-snow motorized travel, as snowmobiles. Where snow accumulation would be sufficient for most snowmobile recreationists, most wildlife as deer, elk and turkey would not be in the same snow-depth zone, and consequently not harassed by such motorized activities. The effect of this extended road and area closure period would be a reduction in overall disturbance to wildlife from fall through spring.

The Road Draw Road area has a higher habitat effectiveness value relating to its mosaic of habitats (meadow, aspen, oak, pine, mixed-conifer habitats, and lower elevation). The closure of this road would contribute to overall less disturbance to wildlife.

Closure of Road Draw Road would remedy the concern with vehicular traffic damaging the wet meadow that the road crosses, which would benefit wildlife and plants associated with the wet meadow similarly to Alternative 1.

Management Indicator Species

This alternative would have similar effects for Management Indicator Species as the Proposed Action. With 830 acres of aspen burning instead of the 700 acres of the Proposed Action, this alternative would provide an additional 130 acres with a high density of aspen snags and fewer acres with the lower snag density associated with the aspen harvest prescription. The northern flicker would be the Management Indicator Species associated with snags. The variance in acreages of different snag densities would be a short-term benefit in quantity of foraging structures, until the snags felled. After the snags fall, the long-term effects would be similar to the Proposed Action.

This alternative would burn substantially less pinyon-juniper acres than the Proposed Action. On the acres treated, the effect of providing winter range forage for deer, elk and turkey would be the same. The lesser acreage treated would provide fewer forage acres in the winter range. The overall forage ratio within the analysis area would be 21%. The percentage of "browse stands" treated would be 19%; the same as the Proposed Action.

Threatened and Endangered Species

This alternative would have the same no effects as the Proposed Action.

Sensitive Species

This alternative would not result in loss of species viability nor lead to future listing as threatened or endangered. This alternative would have similar effects for Sensitive-listed species as the Proposed Action. A difference in acres of snag densities in the created young age-class aspen condition, as described above, would provide more foraging structures for the three-toed woodpecker. As for the northern flicker, this would be a short-term benefit for the woodpecker, until the snags fell. The nesting territories of the woodpecker wouldn't change much, compared to the Proposed Action. The variance in quantities of foraging structures might have a slight effect on nesting success of some individual nesting pairs of woodpeckers, though such would be difficult to assess.

General Diversity Pattern

This alternative would be comparable to the Proposed Action with a general enhancement in diversity pattern resulting from the similar treatments. The abundance or population sizes of some wildlife and of plant species would vary with the differences in acres treated in the different alternatives. This alternative would have the fewest acres treated in the pinyon-juniper habitat, providing only a 2% reduction in this habitat. This 2% reduction of the PJ habitat would increase the sagebrush community by roughly 23%.

This alternative would not augment the plant species diversity through the addition of non-native plant species and, therefore, would have a slight reduction in overall plant species diversity.

Non-Native Wildlife and Plant Species

This alternative would not promote non-native wildlife species. This alternative would not include non-native plant species in artificial seeding. Without some non-native seed species in the seeding mix, controlling the influence of cheatgrass dominance with native species only may be more difficult on burn sites within dense stands of pinyon-juniper and sagebrush, where existing native herbaceous understory vegetation is depauperate or nonexisting,

Wildlife Corridors

The effects of this alternative would be similar to the Proposed Action.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired condition for wildlife and plant habitats.

4.4.8.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON WILDLIFE

The area of influence for the cumulative effects is the same as for the other alternatives.

General Habitat Conditions

Effects of this alternative would be the similar to the Proposed Action. The reduced acres treated in the PJ habitat of the analysis area would be the primary difference for the cumulative effects area, in comparison to the Proposed Action. Treating 350 acres of PJ in the analysis area with Alternative 2 would result in a 2% reduction of the 17,100 acres of PJ within the cumulative effects area.

Open Road Density

Effects of this alternative would reduce open road density for the cumulative effects area . The closure of Road Draw Road would contribute more to the overall habitat effectiveness of the cumulative effects area.

Management Indicator Species

Effects of this alternative would be the same as for the Proposed Action.

Threatened and Endangered Species

Effects of this alternative would be the same as for the Proposed Action.

Sensitive Species

Effects of this alternative would be the same as for the Proposed Action.

General Diversity Pattern

Effects of this alternative would be the same as for the Proposed Action by promoting diversity of habitat conditions in each of the principal habitats. The fewer acres of PJ treatment would provide fewer acres of sagebrush and associated species provided within the cumulative effects area, in comparison to the Proposed Action.

Non-Native Wildlife and Plant Species

This alternative would be the same as the No Action alternative, in not introducing non-native plant species.

Wildlife Corridors

Effects of this alternative would be the same as the Proposed Action.

4.4.9 EFFECTS OF ALTERNATIVE 2 ON FIRE

4.4.9.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON FIRE

Fire Group 0

The direct and indirect effects of this alternative and for this FG are basically the same as the Proposed Action effects, (see Proposed Action, FG 0, section 4.2.9.1). The only difference between the proposed action and this alternative is that no cutting of scattered pinyon-juniper would take place within RARE II, 1983-84 evaluation areas, and 1997 undeveloped inventory areas. There would only be approximately 38 acres in which scattered pinyon-juniper could be cut. The acres in which the pinyon-juniper wouldn't be cut on would have a lower mortality rate of being able to kill the pinyon juniper with the proposed prescribed fire. Without cutting some pinyon-juniper would remain on these sites.

Fire Group 1

With alternative 2 only 38 acres of pinyon-juniper could be cut and burned, with an additional 262-312 acres being burned without cutting. With this alternative only 10 percent of the proposed treated area would be treated and moved toward the desired future condition. With the re-introduction of fire into the pinyon and juniper treatment area, fuel loads would be reduced. The chance of a high intensity stand replacement crown fire would also be reduced within the area treated. The prescribed fire treatment would replicate the effects of natural fire disturbance. The prescribed fire treatment would create openings, these opening would be seeded as necessary. The annual number of fire starts would not change, the number acres burned annually may be increased due to the fact that a continuous source of ground fuels (grass and forbs) which would be present within the treatment area, however the intensity at which these fire would burn would be lower. A greater age class diversity would be represented in the pinyon-juniper types as a result of the re-introduction of prescribed fire.

Fire Group 2

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 2, section 4.2.9.1).

Fire Group 3

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 3, section 4.2.9.1).

Fire Group 5

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 5, section 4.2.9.1).

Fire Group 7

There are three different treatments prescribed for this FG, the aspen burn, the aspen maintenance, and the aspen regeneration harvest.

The aspen burn would encompass 830 acres, of which only 445 acres could have the conifer cut prior to burning. No cutting would take place within RARE II, 1983-84 evaluation areas, and 1997 undeveloped inventory areas. The effectiveness of the burn to remove the conifer component may be reduced by not cutting the conifers within the 445 acres. The direct and indirect effects of this alternative and for this FG are then generally the same as the Proposed Action effects, (see Proposed Action, FG 7, aspen burn, section 4.2.9.1), except that 385 acres may retain a small component of the mixed-conifer component and would be at a greater risk to a unwanted wildland fire in the future.

The aspen maintenance treatment, the direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 7, aspen maintenance, section 4.2.9.1).

The aspen maintenance treatment would reduce the potential of an unwanted wildland fire within 425 acres, which is only 43 percent of the area within the Proposed Action. As the conifer has encroached fuel loads and stand densities have increased. Eventually this vegetation type would be moved toward an entirely different FG. The 57 percent of the area which is not being treated with

this alternative would be moved to a different FG. This area would still be susceptible to an unwanted wildland fire, this type of fire would threaten surrounding stands. By removing the encroaching conifer a true FG 7 would be maintained, pure aspen stands are not considered to be highly combustible. In the short term these stands would be more susceptible to wildland fire. By cutting the conifer additional fuels would be placed on the ground increasing the overall fuel loading. However, with the conifer canopy being removed the potential for a crown fire has also been reduced. The effect of these additional fuels would be mitigated as much as possible by lopping limbs and tops to within 2 feet of the ground. Lopping results in faster fuel decomposition, and reduces the potential flame lengths in the event of a fire. The slash would diminish within 1-3 year period as the needles and twigs dry and separate from the branches. Fuels resulting from this treatment would not be continuous, so fire would not have a continuous fuel source. Overall, there would be a short-term increased fire hazard, but there would be a high level of fire risk reduction over the long-term within the treated area.

The aspen regeneration harvest would reduce the potential of an unwanted wildland fire within this treatment area. Approximately 12% of the area would be treated, fires may still occur within the area, however the spread potential would be greatly reduced. A true FG 7 would be maintained, pure aspen stands are not considered to be highly combustible. In the short term these stands would be more susceptible to wildland fire. With this treatment additional fuels would be placed on the ground increasing the overall fuel loading. The effect of these additional fuels would be mitigated as much as possible by lopping limbs and tops to within 2 feet of the ground. Lopping results in faster fuel decomposition, and reduces the potential flame lengths in the event of a fire. The slash would diminish within 1-3 year period as the leafs and twigs dry and separate from the branches. The skid trails which would be utilized to remove the aspen would act as fuel breaks in the event of a fire. Fuels resulting from this treatment would not be continuous, so fire would not have a continuous fuel source. Overall, there would be a short-term increased fire hazard, but there would be a high level of fire risk reduction over the long-term. In the remaining area as the current aspen component is lost fuel loads would increase, a continuous fuels layer would be established, and mixed conifer would dominate these stands. Fuels characteristics of this nature would burn with extreme intensity. When a unwanted wildland fire would occur suppression efforts would be difficult, slow, dangerous, and very costly. Burning has many positive benefits, besides maintaining a PFC, other values such as wildlife big game, water storage, recreation, etc. would benefit, this alternative would not have a positive net value change on any of these.

Fire Group 10

No treatment is planned for this fire group under Alternative 2, the direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 10, section 4.2.9.1).

Forest Plan Consistency

Under this Alternative, there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. The Desired Conditions and Need for Change listed within the LRMP, for both fuels management and prescribed fire would be moved toward. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would also be met.

4.4.9.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON FIRE

All Fire Groups

Within the Cumulative effects area (ESFMZ) past activities along with fire suppression policies has led to conditions prone to large scale wildfires of catastrophic proportions (Federal Wildland Fire Management Policy & Program Review, 1995). Large wildfires are very difficult, dangerous, and costly to suppress. The risk of wildfire is particularly important in terms of fires which may occur on the National Forest lands and have the potential to burn onto private lands. Implementation of this Alternative would reintroduce fire to (9,080 - 9,280) acres of land, and treat an additional 591 acres of fuels. This is (2,570 - 3,025) acres less than the Proposed action burned, and 711 acres less of other vegetation treatments. All treatments would reduce the threat of a large scale wildfire, but at a lesser scale than the Proposed Action. This treatment would increase future opportunities of allowing naturally ignited fires to burn under specified conditions. Within the LBS analysis area an additional 416 acres would be treated utilizing prescribed fire, thus reducing additional fuel load levels. Any other treatments would also reduce the threat of a large scale wildfire. In general the number of acres, and the intensity at which these would burn would be reduced. Within the sagebrush the intensity at which fires would burn would be reduced, but the size of these fires may increased, due to available ground fuels (grass/forbs).

4.4.10 EFFECTS OF ALTERNATIVE 2 ON HERITAGE RESOURCES

Proposed activities would not impact known historic properties. Therefore, there will be no effects.

4.4.11 EFFECTS OF ALTERNATIVE 2 ON SOCIO/ECONOMICS

4.4.11.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON SOCIO/ECONOMICS

Implementation of this alternative would result in the removal of approximately 110 MBF of conifer sawtimber and 619 MBF of aspen. Total stumpage value to the Forest Service is estimated at $29,069.92. The design of these treatments would favor Stoltze Aspen Mill in Sigurd, Utah who may or may not subcontract the logging with local (Garfield and Wayne County) loggers. The conifer volume which is incidental to the aspen treatments would most likely be processed by local sawmills.

The design of the various burning and mechanical treatment projects would improve game habitat, particularly in terms of turkey, deer and elk, thereby potentially increasing the recreational hunting opportunities over the long term as measured by the total acres of treatment, 12,952-13,602 acres. Treatments in the pinyon-juniper and sagebrush may reduce deer feeding in the Salt Gulch and Boulder ranches and thereby reduce deer depredation permits. Overall, the various fuel treatments would reduce the risk to catastrophic fire and their suppression costs.

Economics

The costs of implementing this alternative are as follows:

NFMA/NEPA planning	$66,500.00
Sale administration	$12,023.85
Sale Preparation	$28,298.70
Survival/Stocking Exams	$1,087.30
Road Improvements	$ 5,000.00
Road Closure Gates	$ 5,550.00
Sagebrush Burning	$5,625.00
Pinyon-Juniper burn	$3,255.00
Oak burn	$18,050.00
Ponderosa pine burn	$630,000.00
Mixed Conifer burn	$29,250.00
Aspen burn	$25,730.00
Total Costs	$830,369.85

The benefits would include money generated from the timber sale receipts which is estimated at $29,069.92 with the removal of 729 MBF of forest product. Benefit cost ratio is .42. Based on the 1997 TSPIRS report for the Dixie National Forest, the timber sale would provide 11.6 jobs, produce $577,873.88 in local income, and produce $86,660.67 in federal income tax revenue.

4.4.11.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON SOCIO/ECONOMICS

The scope of the cumulative effects analysis includes the Garfield and Wayne Counties's local economies. The release of 729.16 MBF of forest products could provide short term security to local small operators. Of greater importance is the supply of aspen logs to the developing aspen industry in Sigurd, Utah which has been recently purchasing aspen off of the Dixie National Forest.

4.4.12 EFFECTS OF ALTERNATIVE 2 ON AIR QUALITY

4.4.12.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON AIR QUALITY

Parameters

There are five parameters important to the determination of air quality and its potential effects. These include amount of airborne particulates, gaseous pollutants, visibility, Prevention of Significant Deterioration (PSD) designation, and proximity to residential private subdivisions or Class I airsheds.

Existing Airborne Particulates

The direct and indirect effects on existing airborne particulates under this alternative are the same as the Proposed Action, (see the Proposed Action, existing airborne particulates, section 4.2.12.1).

Fire Group 0

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 0, section 4.2.12.1).

Fire Group 1

Prescribed burning would occur on 300-350 acres. Based on 330 acres being burned with 4 tons per acre being consumed and an emission factor of 40 lbs. per ton, 6.6 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Particulate emissions from the burn would not be substantial. The majority of emissions would be produced within the first 6 hours of ignition, and would then dramatically decrease. A small amount of residual smoke would be evident following each initial ignition for up to 3 days. Implementation of the burn could take up to two years to complete. Smoke management guidelines would be based on the Prescribed Fire Smoke Management Guide 420-2 (SMG), a publication of the National Wildfire Coordinating Group, and the Utah Smoke Management Plan procedures would be followed to assure that burning occurs only during days with favorable dispersion factors.

Fire Group 2

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 2, section 4.2.12.1).

Fire Group 3

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 3, section 4.2.12.1).

Fire Group 5

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 5, section 4.2.12.1).

Fire Group 7

Prescribed burning would take place on 830 acres in this fire group. Based on 830 acres being burned with 5 tons per acre being consumed and an emission factor of 25 lbs. per ton, 51.9 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial as most of the emissions would be produced within the first 6 hours of ignition each day, and would then dramatically decrease each day. It is estimated that a small amount of residual smoke emissions would be evident for up to 3-5 days following each day of ignition. Implementation of the burn could take up to four years to complete. The Utah Smoke Management Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Within the 425 acres of aspen maintenance no burning would take place. However there would be a small increase in the amount of carbon monoxide and fugitive dust produced, as result from conifer removal. This increase would be short term, and only take place while the conifer is being removed.

Within the 166 acres of aspen regeneration harvest no burning would take place. However there would be a small increase in the amount of carbon monoxide and fugitive dust produced, as result from aspen cutting/removal. This increase would be short term, and only take place while the aspen is being removed.

Fire Group 10

Within this fire group no action would take place, The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 10, section 4.2.12.1).

Emission Production and Duration

The direct and indirect effects on emission production and duration under this alternative are the same as the Proposed Action, (see the Proposed Action, emission production and duration, section 4.2.12.1).

Gaseous Pollutants

The direct and indirect effects on existing gaseous pollutants under this alternative are the same as the Proposed Action, (see the Proposed Action, gaseous pollutants, section 4.2.12.1).

Visibility

The direct and indirect effects on visibility under this alternative are the same as the Proposed Action, (see the Proposed Action, visibility, section 4.2.12.1).

Prevention of Significant Deterioration (PSD)

The direct and indirect effects on prevention of significant deterioration under this alternative are the same as the Proposed Action, (see the Proposed Action, PSD, section 4.2.12.1).

Proximity to Private Subdivisions or Class I Airsheds

The direct and indirect effects on proximity to private subdivisions or class I airsheds under this alternative are the same as the Proposed Action, (see the Proposed Action, proximity to private subdivisions or class I airsheds, section 4.2.12.1).

Forest Plan Consistency

Under this Alternative there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. Desired Conditions and Need for Change listed within the LRMP, for fuels management, air quality, and prescribed fire would be met. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would be met.

4.4.12.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON AIR QUALITY

The cumulative effects of this alternative are generally the same as the Proposed Action, (see Proposed Action, air quality, cumulative effects, section 4.2.12.2), except that 983.10 tons of particulate matter would be produced from prescribed fire activities.

4.3.13.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON LIVE STOCK GRAZING

The greatest potential effect from the Alternative 2 would develop from the regeneration treatments within the aspen stands, both fire and harvest methods. These areas treated would attract livestock especially when adjacent to key areas. If construction of a fence is necessary to protect aspen regeneration in the burn unit above Haws Pasture, then approximately 500-600 acres would be lost temporarily (3-5 years) from transitory grazing. However, if the project is implemented in a 1-2 year period, the extent of the treatments will diffuse grazing intensities to the extent that a fence should not be necessary. Treatments in the sagebrush, PJ, and oak could also attract increased grazing intensities but would be regulated by the standards and guidelines of the term grazing permit. Some areas, such as Pretty Tree Bench are not grazed, and should not receive additional grazing pressure. Treatments in the ponderosa pine and mixed conifer should not effect grazing activity.

Livestock will benefit over the long term from these treatments from the increase in forage quantity and quality by the total acres of treatment, 12,952-13,602 acres. Maintenance for aspen stands versus conifer conversion will result in higher forage production. Studies have shown that within aspen stands (Harniss, 1982), increases of 20 basal area/acre of conifer trees can reduce understory production by more than half. Furthermore, conifer conversion will reduce water yields, and reduce plant diversity. Therefore livestock will benefit from the 996 acres of aspen regeneration and 1,000 acres of aspen maintenance. These treatments occur on transitory range and will not lead to changes in the livestock numbers.

4.4.13.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON LIVESTOCK GRAZING

In addition to the cumulative effects described in the Sand Creek Soil Stabilization Project (EA, chapter 4, pages 101-102), and LBS Vegetation Treatment Project (EA, Chapter 4, pages 68-69) there would be an increase in quantity and quality of forage commensurate with the total acres of treatment, 12,952-13,602.

4.4.13.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

The Proposed Action would cause no adverse effects nor any irreversible/ irretrievable commitments in relation to Livestock Grazing.

4.4.14 EFFECTS OF ALTERNATIVE 2 ON SPECIAL USES AND ON MINERALS

4.4.14.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON SPECIAL USES AND ON MINERALS

This alternative would be similar in any effects as the Proposed Action alternative and Alternative 1.

4.4.14.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON SPECIAL USES AND ON MINERALS

This alternative would be similar in effects as the Proposed Action alternative and Alternative 1.

4.4.15 EFFECTS OF ALTERNATIVE 2 ON TRAVEL MANAGEMENT

4.4.15.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 2 ON TRAVEL MANAGEMENT

The effects of implementing Alternative 2 on travel management would be a result of the amount of road reconstruction, the amount of roads remaining open to motorized travel and the amount of roads on which the type of use is being altered.

Travel management activities under Alternative 2 are the same as those identified for the Proposed Action with the following exceptions; Forest Road 514 would be closed to motorized travel. As a result the OHV Loop would not be realized. This would result in 47.1 miles of road open to travel by motorized vehicles. The direct and indirect effects of the management activities are disclosed in the proceeding resource sections. Appendix 3, Map J graphically depicts the roads which would remain open, those which would be seasonally closed and the OHV Loop.

Approximately 17,500 acres within the project area would be open to travel by over the snow machines.

Alternative 2 is consistent with the direction provided in the Land and Resource Management Plan for the Dixie National Forest. Implementation of Alternative 2 would move the analysis area towards the Desired Future Condition as described in Chapter 1.

Road Density

The open road density within the analysis area would be 0.9 miles per square mile.

4.4.15.2 CUMULATIVE EFFECTS OF ALTERNATIVE 2 ON TRAVEL MANAGEMENT

Travel management activities directly and indirectly effect the other resources within the analysis area.

Effects of sediment due to road reconstruction, road closures, or changes in use are discussed in the proceeding resource sections of this document.

4.4.15.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ

There would be no irretrievable or irreversible commitment of resources with the implementation of Alternative 2. The area and road closure decisions are not irretrievable and can be reversed. The creation of the OHV Loop could also be reversed by reclaiming the trail location and rehabbing the trail to its original condition.

4.5 ALTERNATIVE 3

4.5.1 EFFECTS OF ALTERNATIVE 3 ON VEGETATION

4.5.1.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON VEGETATION

Forest Ecosystems

Ecosystems

Approximately 200-250 acres of existing **sagebrush** stands would be treated with stand replacement prescribed fire followed with seeding where current seed source is inadequate. This action would create patches of grass/forbs with little if any sagebrush and conifer trees. It is expected that within 2-3 years sagebrush regeneration would initiate. Overall, this action would create a better balance of age classes more representative of historic fire frequencies and patterns (Draft Properly Functioning Condition - Process-- 12/23/96, pages 28, 14-15, 17-19, Draft PFC for Major Vegetation Types, pages 4, 16-17, 19-22).

Within the **PJ** zone 3,000-3,500 acres, would be treated with a combination of cutting and prescribed fire to create more open or savannah like stand conditions with grass/forbs/shrubs established in the interspaces. This treatment would occur in areas conducive to fire, such as high density stands adjacent to sagebrush flats, as opposed to open stands on rocky hillsides. This action would result in greater representation of a seral stage of stand development characteristic of the natural or historic periodic fire regime. In some cases the stands would revert back to early grasses. Studies indicate (Gottfried, 1996) in Utah, juniper will be the first tree species to invade with tree dominance occurring in 70 to 80 years. In other cases fire will create open savannah like stands with greater concentrations of ground vegetation in openings. Areas treated with fire which are lacking in grass/forbs seed sources or are subject to erosion will be seeded. Restoration of PJ sites to restore ground vegetation require a combination of tree thinning and application of grass seed (Chong, 1994). Elimination of livestock grazing alone will not restore areas (Chong, 1994, Bunting, 1986). Approximately 780 acres of this treatment would entail felling conifer trees which are overtopping brush, such as oak. The overall effect of this treatment will be greater diversity of stand densities, age classes, and increased understory vegetation. Conditions will also more closely mimic those within the historic ranges (Draft Properly Functioning Condition - Process-- 12/23/96, pages 23, 10-11, 13-14, Draft PFC for Major Vegetation Types, pages 4, 12-13, 19-22).

Burning of 450-500 acres of oak brush, would rejuvenate the oak clones into a younger, seral stage of new oak sprouts (Clary and Tiedemann, 1993). Conifer trees found within the oak would be removed from burning, thus creating snags. Burning the oak stems would stimulate sprouting. This action would provide greater diversity of stages of oak stand development more characteristic of historical fire disturbances (Draft Properly Functioning Condition - Process-- 12/23/96, pages 25, 12-13, 15-16, Draft PFC for Major Vegetation Types, pages 4 and 15, 19-22).

A cool surface fire treatment would be prescribed on approximately 7,000 acres of **ponderosa pine** stands. This action is designed to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir (Covington and Moore, 1995). Mortality to some live ponderosa pine trees would increase snag densities and provide areas suitable for pine regeneration. Generally this action will move stand conditions more closely associated with the historic frequent fire regime (Sackett, 1990) and reduce the risk to catastrophic fire (Draft

Properly Functioning Condition - Process-- 12/23/96, pages 22, 9-10, 12-13, Draft PFC for Major Vegetation Types, pages 4, 10-12, 19-22).

Aspen would experience three different treatments; 650 acres of removal of understory conifer trees, 204 acres of aspen regeneration using harvest methods, and 800 of aspen regeneration using stand replacement fire. The removal of understory conifer trees is designed to provide more areas in which aspen will dominate now and in the near future (Harniss, 1982, Alder, 1970). The conifer trees are small enough to limit damage to the residual aspen trees. Both regeneration treatments would be designed to kill the existing conifer and aspen trees, thereby stimulating the aspen sprouting (Schier, 1975, Debyle and Winokur, pg 197-198, Brown, 1985) and eliminating conifers. Aspen sprouting would occur within 1-3 years. Initial suckering rates can be as high as 10,000-30,000 tree per acre with 65% mortality within ten years (Hittenrauch, 1984). The intensity of the treatments in terms of tree removal/mortality was based on suckering rates increasing with degree of tree removal, clearcutting being optimum (Hittenrauch, 1984, Frykman, Jacobi, 1990). The 1004 acres of aspen regeneration will create a better balance of age and structural class diversity of aspen and reduce the succession to conifers across the project area. The long term effect of these treatments would be to establish young healthy seral aspen clones with minimal conifer composition, capable of survival, and serving in the future as replacement old growth/dominant aspen stands as other aspen stands not regenerated succeed to conifers. Use of fire on 800 acres will mimic the historical disturbance effect of fire behavior. Overall these treatments will create conditions closer to those found within the historic range, patterns, and structural stages (Draft Properly Functioning Condition - Process-- 12/23/96, pages 17, 3-4, 9-10, Draft PFC for Major Vegetation Types, pages 4, 7-9, 19-22).

The **mixed conifer** zone would have 300-350 acres of cool surface fire prescribed. The intent of this treatment is similar to that proposed in the ponderosa pine in which fire would be used to reduce ground and ladder fuels, release accumulated nutrients found in the leaf litter, and reduce the more shade tolerant true fir. Mortality to some live ponderosa pine/Douglas-fir trees would increase snag densities and provide areas suitable for pine/Douglas-fir regeneration. Generally this action will move stand conditions more closely associated with the historically frequent fire regime and reduce the risk to catastrophic fire (Draft Properly Functioning Condition - Process-- 12/23/96, pages 19-205-7, 10-12, Draft PFC for Major Vegetation Types, pages 4, 9-10, 19-22).

Ecosystem Health

The use of harvest and burning methods in the sagebrush PJ, oak, ponderosa pine, aspen and mixed conifer would mimic disturbances associated with the historic fire regime. Sagebrush ecosystems would be restored to a better balance of age classes and range increased to more historical levels. The effect would be creation of stand fuel conditions within the ponderosa pine and mixed conifers more closely associated with a frequent fire regime while increasing snag distribution in the previously harvested stands. Decadent aspen stands would be rejuvenated. Seral, conifer free stands of oak would be created. This would have the net effect of increasing the health of the ecosystem for both the short and long term by the overall acres treated, (12,604-13,254).

Stand Health

The effect of stand replacement fire in 200-250 acres of sagebrush will be to create a more diverse ecosystem of age structure diversity which improves the overall health of the sagebrush stands.

Within the treated 3000-3500 acres of PJ, stand health would be improved in the short term by substantially decreasing stand densities. Over the long term, creation of a younger stand of PJ and a

more heterogenous landscape would reduce the potential for insect activity as compared to a mature homogenous stand. In addition, creation of a mosaic of stand conditions, reduces the potential for a landscape level disturbance and will create stand conditions conducive to more frequent fire.

Treatment in the oak would rejuvenate the existing oak, eliminating conifer encroachment, and creating a younger and healthier stand of oak. Over the long term, these stands would provide longer term stability than the untreated clones.

7000 acres of prescribed fire within the ponderosa pine and 300-350 acres within the mixed conifer would have the benefit of releasing nutrients currently held in the leaf litter to surrounding trees. Reducing both the ground and ladder fuels would provide greater security against stand replacement fire throughout the conifer belt. Some tree mortality, generally less than 5%, would be expected to accomplish the burning.

The aspen treatments would rejuvenate the diseased, mature stands of aspen, thus creating younger, disease free clones. These clones would be more capable of surviving over the long term.

These treatments would have the net effect of increasing the health of the stands for both the short and long term by the overall acres treated, (12,604-13,254).

Productivity

The short term effect of surface fire within the ponderosa pine and mixed conifer will be the availability of nutrients release by the burning versus the loss of trees and nutrients caused by extreme fire behavior. Tree mortality will create understocked openings and loss of stand productivity. The long term effect will be, more resilient conifer ecosystems to catastrophic losses from stand replacement fire.

Within the aspen zone, removal of the existing trees would reduce current site utilization. It is estimated that it will require approximately 15 - 20 years for these stands to return to existing site utilization levels. Once this occurs, productivity would increase as a young healthy, fully stocked stand of aspen grows towards maturity.

Overall, there will be some losses to stand productivity over the short term by the 7,504-7,554 acres of treatment. However, long term stand productivity would be improved by those same treated acres with the reduction of risk to stand level mortality and understocking.

Vegetative Structural Stage Distribution

Within the Side Hollow Nest Area, there would be 18 acres of aspen maintenance in which understory conifers would be removed non-commercially, and 93 acres of underburning in the ponderosa pine. Both of these treatments are acceptable methods for managing nest area vegetation and will move the area towards a more desirable condition (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 21-22) by removing undesirable understory trees with non-uniform spacing using hand tools. Also within the PFA, 223 acres of ponderosa pine underburning and 4 acres of aspen regeneration harvest are proposed. This action also utilizes acceptable methods and effects by increasing snags, reducing hazardous fuels and recycling nutrients, and encourage aspen and oak regeneration (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 22-26).

For the Sand Creek home range, the nest area would have 30 acres of aspen maintenance and 134 acres of ponderosa pine. Within the PFA, there would be 557 acres of ponderosa pine underburning. Effects would be similar to those described under the Side Hollow home range.

No Treatments are planned in the McGath Lake nest area. However, within the PFA, up to 38 acres of aspen would be treated with fire, thereby regenerating approximately 20% of the aspen stands.

Within the foraging areas the following would occur; 602 acres of aspen maintenance, 204 acres of aspen regeneration harvest, and 586 acres of aspen regeneration burning, 5,993 acres of ponderosa pine underburning, and 300-350 acres of mixed conifer underburning. Although specific aspen management for the northern goshawk have not been developed, applying the general habitat principles from the conifer habitat would develop suitable habitat management. For aspen, management would create a variety of VSS classes through the regeneration methods, provide more stable aspen through understory removals, increase snags via burning, and recycle nutrients (Management Recommendations for the Northern Goshawk in the Southwestern United States, pages 26-30). The "Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah (1998) provides for use of local assessments in designing treatments in aspen habitat. The planned aspen regeneration patterns fall within the historic range of variation to mimic natural disturbance patterns.

Initially, aspen regeneration areas may be too large an opening for suitable goshawk habitat, but once stocking is fulfilled and suitable for goshawk use (approximately 15 years), the treated areas will return to suitable habitat. The snag retention and use of irregular shaped, feathered edges, and group retention of live trees may provide sufficient cover to maintain usable habitat in the harvest areas. Mosaic burn patterns may also retain sufficient cover to maintain habitat. These treatments would provide long term sustainability of aspen, considered desirable for certain goshawk prey.

Forest Land Suitability

Under this alternative, only lands suitable for timber production would be harvested. Mitigation measures would provide protection of these sites as well as other proposed treatments for long term productivity. Therefore there will not be any effect.

Old Growth

Treatments in the pinyon/juniper and aspen would have an effect on existing and future old growth. The initial effect on the PJ stands, would be loss of up to 904 acres of existing old growth, reducing existing habitat to 5,418 acres or 36 percent of the PJ vegetation. However, the prescribed burning may retain sufficient large old trees or due to the mosaic burn patterns leaving sufficient areas unburned that little if any old growth habitat would be lost. The benefit of this treatment approach is to create a more heterogenous landscape which is less susceptible to catastrophic stand replacement fire, including the loss of existing old growth. In the long term (250-300 yrs), these stands may serve as replacement old growth stands and ensure a more continued presence of old growth habitat over time.

Approximately 512 acres of existing ponderosa pine old growth would be treated with low intensity surface fire to reduce ground and ladder fuels, as well as replicating the natural role of fire. This treatment has been recommended (Covington and Sackett, 1986, 1990, Covington and Moore 1994 and 1994, Kolb et al, 1994) to enhance stand conditions favorable to old growth.

Some mortality may occur but would not be at levels which would eliminate a stand from qualifying as old growth. Past experience with underburning in ponderosa pine in areas such as Stump Springs demonstrates less than 5% tree mortality favoring trees in the low to middle size classes. Creation of snags would improve the quality of the old growth.

There will not be mixed conifer old growth proposed for underburning. These stands are in remote locations and in need of mechanical treatment to reduce stocking levels prior to prescribed fire initiation. These stands would benefit from reduction in risk to catastrophic fire throughout the project area, thereby increasing the ability to suppress fires into the old growth.

Scheduled aspen regeneration treatments would reduce existing old growth by 395 acres to 1,014, or 30% of the aspen within the project area. The long term effect would be that these regenerated stands could provide future old growth in 100 years, thereby ensuring future stability of the aspen type.

In the short term, existing old growth habitat could be reduced by up to 1,299 acres, reducing the total to 7,080 acres. Old Growth would be reduced to 21% of the project area, or 26% of the forested acres. The long term effect would result in greater stability of old growth through reduced risk to catastrophic losses, and the ability to sustain old growth over time.

Forest Plan Consistency

Under this alternative, all proposed treatments are consistent with the Land and Resource Management Plan for the Dixie National Forest. These treatments are designed to move the analysis area towards the Desired Future Condition as described in Chapter 1.

4.5.1.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON VEGETATION

Forest Ecosystems

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). Most recent analysis, (LBS Vegetation Treatment Project), have emphasized, at the watershed scale, developing vegetation diversity, stand composition, structural stages, and using uneven-aged management.

The greatest potential change in effects would be if a large stand destroying event such as fire spread throughout the area. Implementation of Alternative 3 would reduce the risk of catastrophic fire to the sub-watersheds by reducing accumulated ground and ladder fuels and develop greater stand structure and composition diversity. These changes are especially important to the cumulative effects areas since this area is also very similar to the project area, being very homogenous and susceptible to more intense fire than the normal historic range. These treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,604-13,254).

Ecosystem Health

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). Most recent analysis, (LBS

Vegetation Treatment Project), have emphasized, at the watershed scale, developing vegetation diversity, stand composition, structural stages, and using uneven-aged management.

Implementation of Alternative 3 would improve the ecosystem health at this scale given the extent of proposed treatments which will reduce stand densities, decrease shade tolerant species, reduce forest floor fuel accumulations, and maintain certain key ecosystems (oak, seral species dominated by mixed conifer, and aspen) . These changes would result in increasing the diversity of the sub-watersheds and decrease the destructive potential of wildfire eliminating the forest cover at the landscape level. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,604-13,254).

Stand Health

The area of analysis for the cumulative effects would be the Sand Creek and Bear Creek sub-watershed. As the potential for insect/disease activity increases, the risk to adjacent stands increases. Stands with highest density levels and/or age classes could provide a source for infection or infestation into surrounding areas. An example would be dwarf mistletoe infection centers could provide sufficient beetle susceptible trees to build-up populations which then fly into adjacent stands. An additional threat is these mortality centers providing snags/fuel for wildfire which carries into surrounding stands (Knight, 1987). Implementation of the proposed treatments would create greater diversity of stand densities, structure and composition closer to the historic ranges. Greater stability within these ecosystems would decrease levels of insects and diseases at both the project and sub-watershed levels. Therefor these treatments would have the net effect of improving the cumulative effects area by the overall acres treated, (12,604-13,254).

Productivity

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). Most recent analysis, (LBS Vegetation Treatment Project), have emphasized developing strong stand or tree growth on seral species (ponderosa pine, Douglas-fir, and aspen) over long rotations, using uneven-aged management.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area resulting in widespread mortality and hence under utilize site productivity. Implementation of the proposed treatments would reduce the risk of such mortality both within the project and sub-watershed scales. Productivity would be shifter to seral species, which are more capable of attaining the larger sizes (ponderosa pine and Douglas-fir). Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,604-13,254).

Vegetative Structural Stage Distribution

The area of influence for the cumulative effects analysis is the project area divided into the various goshawk management areas for the three nest areas located within the project area (project file, vegetation). Past timber harvests have emphasized management towards even-aged management for ponderosa pine and Douglas-fir with short rotations (120 yrs). The recent LBS decision would develop uneven-aged conifer stands as well as regeneration of aspen, with the intent to develop stands towards northern goshawk habitat (LBS Vegetation Treatment Project, Chapter 4, pages 31-

32) . These activities were designed to improve existing conditions towards the desired future condition for northern goshawk, by emphasizing a younger age class of seral pioneer species. Implementation of these activities as well as those proposed under this project will lead to further enhancement of vegetation conditions for future goshawk habitat.

The greatest potential change in effects would be if a large catastrophic event such as fire spread throughout the area. Implementation of the proposed treatments would reverse this trend by lowering stand densities, reducing shade tolerant species, introducing fire as a disturbance, and enhancing stand structure and composition diversity. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,604-13,254).

Forest Land Suitability

The area of influence for the cumulative effects analysis is the Sand Creek and Bear Creek sub-watersheds. Past timber harvests, being planned prior to the LRMP, did not classify lands for timber suitability. These timber sales did incorporate forestry practices that maintained soil productivity Most recent analysis, (LBS Vegetation Treatment Project), have classified lands for suitability, with only lands suitable for timber production being harvested. Future timber sales would also comply with timber suitability requirements. Therefore there would not be any change on land suitability.

Old Growth

Table 4.1.1 Old Growth by Drainage

Drainage	Total acres	Existing O. Growth ac.	% Existing Old Growth	Predicted Old Growth ac.	Predicted-% Old Growth
Big Hollow	3,872	2,258	58	1,560	40
Dry Hollow	735	19	3	19	3
Pretty Tree	1,535	425	28	425	28
Side Hollow	3,038	245	8	215	7
Lake Creek	14,845	4,243	29	3,855	26
Bear Creek	8,030	1,381	17	1,122	14
Upper Sand Creek	14,582	2,678	18	2,678	18
West Fork Boulder	14,917	1,298	9	1,274	8
Middle Boulder Creek	3,393	362	11	362	11
Total	64,947	12,909	20	11,510	18

Implementation of the LBS Vegetation project would reduce old growth habitat within the Lake Creek drainage by 100 acres of pinyon/juniper, resulting in 3,855, acres of old growth or 26%. With the exception of Dry Hollow, each drainage meets or exceeds the forest plan standard for old growth. No treatment activities are planned within the Dry Hollow old growth.

Implementation of the proposed actions would not only provide for maintaining adequate existing old growth habitat, but would provide for a rotation of future old growth through creating different stages of stand development throughout the project area and hence the cumulative effects area, which is very similar to the project area. The risk to catastrophic or stand replacement fire within the cumulative effects area would be reduced. Therefor these treatments would have the net effect of improving the cumulative effects area for both the short and long term by the overall acres treated, (12,604-13,254).

4.5.1.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be a loss in vegetation cover associated with the road reconstruction, OHV trail construction, aspen maintenance and prescribed fire treatments. Implementation of prescribed fire treatments would reduce existing old growth in the pinyon/juniper and aspen type by 1,299 acres.

Short Term vs. Long Term Productivity - The Proposed Action includes tree thinning and prescribed fire activities which result in short term (less than 10 years) effects, such as mortality of trees from fire and associated reduction in stocking and cover, as described in this section. The design of these treatments includes maintenance or enhancement of long term productivity. In addition, the silvicultural prescriptions and effects will be monitored (Appendix 1) to assure that standards for long-term productivity are met.

Irreversible/Irretrievable Commitments - Ground disturbance associated with OHV trail development, road reconstruction, and prescribed fire would result in loss of existing vegetation. Road reconstruction, trail construction and maintenance activities would revegetate disturbed soil areas. Revegetation of prescribed fire treatments are designed to utilize as much natural regeneration as possible, with unacceptable areas planned for seeding. Succession of vegetation types (sagebrush to pinyon/juniper), tree species (aspen to conifer), reduction of tree or stand growth, ecosystem diversity and old growth aspen would be reduced by the total acres treated 12,604-13,254, but not eliminated.

These losses would be irretrievable but not irreversible.

4.5.2 EFFECTS OF ALTERNATIVE 3 ON RECREATION

4.5.2.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON RECREATION

The direct and indirect effects of implementing Alternative 3 on the recreation resource would be the same as those described for the Proposed Action with the following exceptions.

Off Highway Vehicle (OHV) Use

Implementation of Alternative 3 would reduce the miles of road and trails open to OHV use to 52.9. In addition, seasonal closure of the Road Draw Road would eliminate the OHV loop during the closure period of August 20 to June 1.

4.2.2.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON RECREATION

The cumulative effects of implementing Alternative 3 on the recreation resource would be the same as those described for the Proposed Action.

4.5.2.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Implementation of Alternative 3 would not result in any irretrievable or irreversible commitment of the resource. The decision(s) to reduce the miles of road open to motorized travel, which directly affects some recreation pursuits such as OHV use, is not irreversible or irretrievable and could be reversed with a new analysis and decision.

Effects of Alternative 3 on Wilderness

4.5.2.4 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON WILDERNESS

The direct and indirect effects of implementing Alternative 3 on the wilderness are the same as those described for the Proposed Action.

Cumulative Effects of Alternative 3 on Wilderness

The cumulative effects of implementing Alternative 3 on the wilderness are the same as those described for the Proposed Action.

Other Effects Analysis Required by CEQ Regulation

Implementation of Alternative 3 would not result in an irretrievable or irreversible commitment of the wilderness resource. There are no management activities proposed in or adjacent to the Box-Death Hollow Wilderness Area.

4.5.3 EFFECTS OF ALTERNATIVE 3 ON ROADLESS/UNDEVELOPED RESOURCES

INTRODUCTION

This section describes the effects of Alternative 3 on the roadless/wilderness attributes of natural integrity/apparent naturalness, opportunities for solitude/primitive recreation, special features, and manageability/boundaries. Please refer to Section 4.2.3 for a complete discussion of the analysis methods to be used and to view a table summarizing effects.

4.5.3.1 EFFECTS OF ALTERNATIVE 3 ON IRAS

DIRECT AND INDIRECT EFFECTS

Boulder Mountain/Boulder Top/Deer Lake IRA (No.07040)

Summary of Development

Alternative 3 would result in no development of the Boulder Mountain/Boulder Top/Deer Lake IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would conduct an aspen burn in 127 acres of the total 243 acres of Boulder Mountain/Boulder Top/Deer Lake IRA falling within the Pretty Tree analysis area. Even though some conifer may be cut to carry the fire, it is anticipated that most of the cut wood would be consumed and that the natural integrity and apparent naturalness of the area would be unaffected in the long term. The treated acres would still meet the definition of undeveloped lands.

Solitude and Primitive Recreation
There would be a short term effect on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. This would affect users only during the activity period. With establishment of an OHV Loop Trail, the sounds associated with a probable increase in OHV traffic would reduce the opportunity to experience solitude between June 1 and August 20. Opportunities for solitude would increase during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
The treatment of 127 acres would not have any effect on manageability. The roadless portion of the IRA would remain 111,182 acres.

McGath Lake/Auger Hole IRA (No.070034)

Summary of Development

Alternative 3 would result in no development of the McGath Lake/Auger Hole IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would burn 9 acres of ponderosa pine out of the total 32 acres presently roadless within the analysis area. Since the prescribed fire would replicate a natural process, there would be no effect on the natural integrity and apparent naturalness of the 117 acre portion of the McGath Lake/Auger Hole IRA that falls within the Pretty Tree analysis area.

Solitude and Primitive Recreation
There would be a very short term effect on the ability of users to experience solitude during the actual burn due to the presence of workers. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years. With establishment of an OHV Loop Trail in the northern part of the analysis area, the sounds associated with a probable decrease in OHV traffic in this area would probably increase the opportunity to experience solitude

between June 1 and August 20. Opportunities for solitude would probably decrease during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 3 would have no effect on the manageability/boundaries of the McGath Lake/Auger Hole IRA. The roadless portion of the IRA would remain 8,328 acres.

Box-Death Hollow IRA (No.07033)

Summary of Development

Alternative 3 would result in no development of the Box-Death Hollow IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would conduct a burn of 112 acres of pinyon-juniper and 16 acres of sagebrush in the 1,098 roadless acres of the Box-Death Hollow IRA falling within the Pretty Tree analysis area. Even though pinyon and juniper would be cut to carry the fire in both vegetation types, it is expected that most of the felled wood would be consumed. As a result, there would be no long term effects on the natural integrity and apparent naturalness of the treated 128 acres.

Solitude and Primitive Recreation
There would be short term effect on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. This would affect users only during the activity period. With establishment of an OHV Loop Trail in the northern part of the analysis area, the sounds associated with a probable decrease in OHV traffic in this area would increase the opportunity to experience solitude between June 1 and August 20. Opportunities for solitude would probably decrease during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 3 would have no effect on the manageability/boundaries of the Box-Death Hollow IRA. The roadless portion of the IRA would remain 3,177 acres (including the 2,079 acre Antone Bench parcel within the Box-Death Hollow Wilderness Area.

New Home Bench IRA (No.07035)

Summary of Development

Alternative 3 would result in no development of the New Home Bench IRA and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would conduct burn treatments in 29 acres of ponderosa pine, 60 acres of mixed conifer, 148 acres of oak, 2,241 acres of pinyon-juniper, and 14 acres of sagebrush. The first three burn treatments totaling 237 acres would appear as a natural process to most viewers and would leave no evidence of human activity. The last two treatments totaling 2,255 acres would require cutting of pinyon and juniper trees to carry the fire and it is expected that most of the felled wood would be consumed in the procedure. As a result, there would be no long term effect on the natural integrity and apparent naturalness of the total 2,492 acres in the five vegetation types. All of the acres would continue to meet the definition of undeveloped lands.

Solitude and Primitive Recreation
With the cut and burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine, mixed conifer, and oak treatments. With establishment of an OHV Loop Trail in the northern part of the analysis area, the sounds associated with a probable decrease in OHV traffic in this area would increase the opportunity to experience solitude between June 1 and August 20. Opportunities for solitude would probably decrease during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the IRA, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 3 would have no effect on the manageability/boundaries of the New Home Bench IRA. The roadless portion of the IRA would remain at 6,000 acres. However, if acreages from the adjacent Undeveloped/unroaded Areas No. 3 and 4 were ever combined with the IRA, it would then have more manageable boundaries consisting of FR 153, Utah State Highway 12 and Boulder Creek. The expanded IRA would total 11,461 acres.

4.5.3.2 EFFECTS OF ALTERNATIVE 3 ON OTHER UNDEVELOPED/UNROADED AREAS

DIRECT AND INDIRECT EFFECTS

Undeveloped/Unroaded Area No. 1 (1,764 acres)

Summary of Development

Alternative 3 would treat a total of 956 acres, 300 of which would result in the development of presently undeveloped/unroaded lands. The 300 acres would no longer meet the definition of undeveloped lands and would have to be deleted from the Area. Congress would still have the opportunity to consider the 656 acres of treated lands remaining undeveloped as well as approximately 300 acres of untreated lands for inclusion into the National Wilderness Preservation System. This is because the 956 acre total aggregates with other undeveloped lands to the north and northwest to meet the 5,000 acre minimum requirement. In these acres, present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected mainly by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would conduct burn only treatments in 160 acres of ponderosa pine and in 496 acres of aspen. These burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. Neither activity would have any effects on natural integrity and apparent naturalness. Alternative 3 would also conduct 256 acres of aspen maintenance treatment and 44 acres of aspen regeneration treatment. In the maintenance operation, understory conifers would be cut, leaving stumps and felled tree trunks and limbs. Without prescribed fire to consume any of the felled trees, the wood would be dependent upon wood gathering and ecological processes to decay and become more natural in appearance. The natural integrity and apparent naturalness of the area would be reduced for a number of years. The aspen regeneration treatment would remove most of the standing trees in several clearcuts up to 40 acres in size, leaving stumps on the ground and gaps in the canopy. This would reduce the natural integrity and apparent naturalness of the area for about 20 years based on similar treatments in the Barker Lake area of the Escalante District. Photos documenting this treatment may be found in the Pretty Tree Bench Project File.

Solitude and Primitive Recreation
With the cutting treatments, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine, mixed conifer, and oak treatments. With establishment of an OHV Loop Trail, the sounds associated with a probable increase in OHV traffic would reduce the opportunity to experience solitude between June 1 and August 20. Opportunities for solitude would increase during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
With the development of 273 acres, the remaining 1,491 acres of undeveloped lands could be combined with the Boulder Mountain/Boulder Top/Deer Lake IRA and other undeveloped/unroaded lands to the northwest. If this were to happen, the manageability of the Area would be improved because the IRA would then have Road Draw and private land (Haws Pasture) as a southern and southeastern terminus respectively.

Undeveloped/Unroaded Area No. 2 (2,868 acres)

Summary of Development

Alternative 3 would result in no development of the Undeveloped/Unroaded Area No. 2 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 2,868 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would conduct burn treatments in 59 acres of ponderosa pine, in 175 acres of oak, in 80 acres of pinyon-juniper, and in 93 acres of sagebrush. The ponderosa pine and oak burn treatments would appear as a natural process to most viewers and would leave no evidence of human activity. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon and juniper trees to carry the fire, it is expected that most of the felled wood would be consumed. None of these activities would have any long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine and oak burn only operations would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine and oak treatments. With establishment of an OHV Loop Trail in the northern part of the analysis area, the sounds associated with a probable decrease in OHV traffic in this area would increase the opportunity to experience solitude between June 1 and August 20. Opportunities for solitude would probably decrease during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 3 would have no effect on the manageability and boundaries of the Undeveloped/Unroaded Area No. 2. The 2,868 acres could be combined with the Box-Death Hollow Wilderness Area at some future date. If this were to happen, the wilderness area would gain a more generally identifiable boundary with FR 153 along its northeast border. However, a 152 acre island of private land would detract from the effectiveness of this proposition.

Undeveloped/Unroaded Area No. 3 (3,371 acres)

Summary of Development

Alternative 3 would result in no development of the Undeveloped/Unroaded Area No. 3 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have the opportunity to consider these lands for inclusion into the National Wilderness Preservation System. This is because the 3,371 acre total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearance, solitude/primitive recreation, special features, and ease of manageability would continue, affected primarily by ecological processes.

Effects on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would conduct burn treatments in 26 acres of ponderosa pine, in 323 acres of pinyon-juniper, and in 33 acres of sagebrush. The ponderosa burn treatment would appear as a natural process to most viewers and would leave no evidence of human activity. While the pinyon-juniper and sagebrush burns would require the cutting of pinyon and juniper trees to carry the fire, it is expected that most of the felled wood would be consumed. None of these activities would have long term effects on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With the cut/burn operations, there would be short term effects on the ability of users to experience solitude because of the sounds of chainsaws and the presence of workers. The ponderosa pine burn only operation would affect the opportunities for solitude and primitive recreation to an even lesser extent. The opportunities for primitive recreation within the treatment area would be impacted for only a few days with a repeat in 3-5 years for the ponderosa pine treatment. With establishment of an OHV Loop Trail in the northern part of the analysis area, the sounds associated with a probable decrease in OHV traffic in this area would increase the opportunity to experience solitude between June 1 and August 20. Opportunities for solitude would probably decrease during the August 20 to June 1 Road Draw Road closure period.

Special features, Special Places or Special Values
No special features or places have been identified within the Area, therefore there would be no effect on any.

Wilderness Manageability and Boundaries
Alternative 3 would have no effect on the manageability and boundaries of the Undeveloped/Unroaded Area No. 3. The 3,371 acre Area would offer the possibility of being combined with the 6,000 acre New Home Bench IRA and the 2,090 acre Undeveloped/Unroaded Area No. 4 . If this were to happen, the 11,461 acre IRA would gain a more easily identifiable boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

Undeveloped/Unroaded Area No. 4 (2,090 acres)

Summary of Development

Alternative 3 would result in no development of the Undeveloped/Unroaded Area No. 4 and would have minimal effects on the wilderness attributes described in Chapter 3. Congress would still have

the opportunity to eonsider these lands for inclusion into the National Wilderness Preservation System. This is beeause the 2,090 aere total aggregates with other undeveloped lands to meet the 5,000 acre minimum requirement. Present levels of natural integrity/natural appearanee, solitude/primitive recreation, speeial features, and ease of manageability would eontinue, affected primarily by eeologieal processes.

Effeets on Wilderness Attributes

Natural Integrity and Apparent Naturalness
Alternative 3 would eonduet burn treatments in 224 acres of pinyon-juniper, and in 33 aeres of sagebrush. Both burn treatments would require the eutting of pinyon and juniper trees to earry the fire and it is expected that most of the felled wood would be consumed. Neither of these activities would not have long term effeets on natural integrity and apparent naturalness.

Solitude and Primitive Recreation
With these eut/burn operations, there would be short term effeets on the ability of users to experience solitude beeause of the sounds of ehainsaws and the presence of workers. The period of interruption in any of the above treatments would be of short duration. With establishment of an OHV Loop Trail in the northern part of the analysis area, the sounds associated with a probable decrease in OHV traffie in this area would inerease the opportunity to experienee solitude between June 1 and August 20. Opportunities for solitude would probably deerease during the August 20 to June 1 Road Draw Road elosure period.

Special features, Special Places or Special Values
No speeial features or plaees have been identified within the Area, therefore there would be no effeet on any.

Wilderness Manageability and Boundaries
Alternative 3 would have no effect on the manageability and boundaries of the Undeveloped/Unroaded Area No. 4. The 2,090 aere Area would offer the opportunity of being eombined with the 6,000 aere New Home Beneh IRA and the 3,371 aere Undeveloped/Unroaded Area No. 3 . If this were to happen, the 11,461 acre IRA would gain a more easily identified boundary with FR 153 along its southwest border, Utah State Highway 12 along its southeast border, and Boulder Creek along its east border.

4.5.3.3 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON ROADLESS/UNDEVELOPED

Introduction

Cumulative effects will be divided into two seetions: 1) Effects on IRAs and 2) Effects on undeveloped/unroaded lands.

Effects on IRAs

With implementation of Alternative 3, no acres would be developed in the four IRAs represented in the analysis area. The combined 133,192 roadless acres in those four IRAs and total of 305,806 roadless acres encompassed in the thirteen (13) IRAs in the CEA would remain as at present. The antieipated Donkey/Park Ridge Vegetation Project on the Teasdale Distriet is a foreseeable future action that may develop several hundreds of aeres of the Boulder Mountain/Boulder Top/Deer Lake IRA. Both the Final Roads Rule and the President's reeent Roadless Initiative are foreseeable future

actions that may affect the number of acres of roadless in the CEA. Based on known information, if Alternative 3 were to be implemented, more than 99.5% of the roadless IRA lands available within the CEA would remain unaffected.

Effects on Undeveloped/unroaded Lands

With implementation of Alternative 3, a total of 300 acres would be developed in the four Undeveloped/Unroaded Areas represented in the analysis area. This figure represents 3% of the combined 10,073 undeveloped acres in those four Areas. With the passage of time and a continuation of ecological processes, all 300 developed acres would eventually be returned to an undeveloped/unroaded condition. There are no other known projects that would affect undeveloped/unroaded character within the CEA.

4.5.3.4 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Normally, any road building and associated maintenance in a roadless/undeveloped area is an irreversible commitment of the resource to a non-wilderness condition for the long-term. Even with the minor reconstruction of certain wet sections of the already constructed Road Draw Road under Alternative 3, there would be no irreversible or irretrievable effects on these resources.

4.5.4 EFFECTS OF ALTERNATIVE 3 ON VISUAL QUALITY

Effects on Visual Quality by the various actions is measured by the amount of visual changes that would take place and their duration. Achieving long-term visual quality goals in a forest environment is a dynamic process. Vegetative treatments sometimes cause temporary periods of unacceptable visual changes, therefore it is important to plan actions so that an attractive sequence of views is maintained and Visual Quality Objectives (VQO's) are met.

The following discussion of Alternative 3 will describe expected changes in the visual landscape within the Pretty Tree analysis area viewshed. It will be discussed in terms of the effects on the visual elements (form, line, color and texture) expected.

4.5.4.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON VISUAL QUALITY

Guidance for this section is found in the Visual Management System, Agriculture Handbook No. 462, NFLM, Vol. 2. Alternative 3 would treat between 12,604 and 13,254 acres of the 33,929 acre analysis area. The effect would be greater diversity in vegetation species, size, color, texture and vigor.

Visual Quality Objectives (VQO's)

The effects of the activities proposed with this alternative would meet the VQO's as described in the Proposed Action (Section 4.2.4.1). The reconstruction of minor sections of Road Draw Road would have no effect on meeting VQO's (see Line: in Section 4.5.4.1 below). Likewise, the seasonal closure of Road Draw Road and the associated seasonal loss of the OHV loop would have no effect on meeting VQO's.

Landscape Character

Alternative 3 would cause both short-term and long-term changes in landscape character in the analysis area. The character of the stands would change to a more open condition. The forest would be less compact and less dark with removal of some of the overstory and would display greater visual variety. This visual condition would be stable as the vegetation treatment would have reduced the chances of a major insect or fire disturbance.

Dominance Elements

As previously indicated, dominance elements are the simplest visual recognition parts which make up the characteristic landscape. Alternative 3 is discussed below in terms of changes in form, line, color and texture which would occur.

Form: This visual element is usually dominant because of the vast scale involved.

Examples in the project area are the rocky ridges and the steep Sand Creek drainage basin. Alternative 3 would have no effect on the land and water forms of the project area.

Line: Live trees and snags provide important vertical line values to the forest landscape. In other instances, horizontal lines such as those made by a road bed, road cuts or fills present an unnatural contrast with the forest floor. With Alternative 3, the verticality of some trees would be roughly comparable to the Proposed Action because of the reduction in cutting. Any existing road scars currently visible in the middleground of FR #153 would remain visible. In the short term, horizontal lines resulting from the reconstructed portions of Road Draw would be apparent but would not be evident after one or two growing seasons. After one or two growing seasons, proposed skid trail systems would be more natural in appearance but may not be fully integrated into the landscape until regeneration has occurred for a 5-10 year period.

Color: Overall, the color variety in the landscape would be increased with Alternative, 3 but not to the degree that would occur with the Proposed Action. In the short-term, disturbances created by the proposed vegetation treatments would result in more earth browns and burnt blacks showing. After one or two growing seasons, reseeded and naturally regenerated grasses and forbs would restore the yellow/green colors that would contrast pleasingly with the light aspen greens and the darker greens of the conifers. The grayish brown color of snags would continue to contrast with the dark green conifers and the grayish white trunks, spring greens and fall yellows of the aspen would increase as they proliferate due to patchcuts and burns. Any white sawed log ends and black partially burned slash originating from this action would be removed from Sensitivity 1 road and trail Foreground zones. The creation of large bare brown soil areas from the construction of landings and skid trails would reduce visual quality in the short term. These effects would be unnoticed after one or two growing seasons. The riparian areas would continue to display the present variety of colors.

For trail users, there would be a short-term visual impact since they are traveling at a slow pace and since some trails pass alongside proposed aspen burn units. The opportunity of observing what may be unacceptable visual disturbances to some would be increased until the blackened areas were covered again with new growth. In trail Foreground zones, the mitigating measures stated in Chapter 2 would be applied to keep and/or bring impacts within the parameters needed to meet the appropriate VQO's.

Texture: Under Alternative 3, the overall vegetation texture would become somewhat more coarse, but not to the degree that would occur with the Proposed Action. Any future openings in the more open forest landscape would be less noticeable than at present. Proposed treatments would promote greater irregularity in canopies increasing textural variety in both the short and long term.

Compliance with VQO'S

The desired VQO's would not always be met within the foreground and middleground of primary roads and trails in the analysis area because of debris left from previous sales or treatment activities. Under Alternative 3, however, many of these areas would be brought closer to the required VQO due to burning activities which would reduce slash and residue from past actions

Desired Future Condition

Alternative 3 does not conflict with the LRMP. The Plan allows timber harvest in the affected management areas and specifies enhancing visual quality. This action would move the project area toward the desired future condition of having increased visual variety through the various treatments.

4.5.4.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON VISUAL QUALITY

With this alternative, the analysis area would become more visually attractive to recreationists. There would be no cumulative visual effects from other nearby vegetation treatment projects such as LBS. If the Hell's Backbone Road is someday officially designated as a national scenic backway, an increase in visitor use would occur, possibly accompanied by an increase in site degradation.

Other cumulative effects on the visual resource would be those that may occur on private land within the analysis area.

4.5.4.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

With Alternative 3, events such as major wildfires and/or other disturbances would less likely change the visual setting. The extent of alteration would depend on the event itself.

No irreversible or irretrievable effects would occur to visual quality as a result of Alternative 3. Because vegetation grows back over time, timber harvesting and other proposed treatments would not cause any irreversible impacts. Natural processes such as fire, wind, drought, and natural succession would continue.

4.5.5 FFECTS OF ALTERNATIVE 3 ON SOILS

4.5.5.1 DIRECT AND INDIRECT EFFECT OF THE ALTERNATIVE 3 ON SOILS

A soil erosion model was used to calculate on-site (treatment areas) soil erosion for each soil under treated conditions for each of the action alternatives compared to the current erosion rates of the no-action alternative using procedures outlined in the publication Estimating Soil Erosion Losses From Utah Watersheds (Tew, 1973).

During the environmental analysis a critical soils area map was developed which identified all the areas that would have a possible impact on the soil and water resources. Specific mitigation (soil and water conservation practices) were developed to either avoid completely or to minimize the

potential damage to these resources (see also Map L, App. 3).

All soils proposed for treatment were evaluated from the standpoint of soil erosion relative to soil loss tolerance thresholds (T values).

Logging harvest can damage the soil resource and decrease long term productivity of the soil. The major impacts are typically caused by soil compaction, surface disturbance, and fire effects. A goal when implementing management activities if is to protect long-term soil productivity and soil hydrologic function. On timber sales detrimental effect is defined as 15% reduction in inherent soil productivity potential (FSH 2509.18). The desired future condition following logging activities is that long term soil productivity and hydrologic function will be maintained on as many acres as possible, but at least 85% of the activity area. From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document. (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) SWCP's are implemented as timber sale contract provisions in timber sales (SWCP 14.01) and soil considerations in prescribe burn planning (SWCP 18.02). As part of the NEPA process, soils suitability was determined for tractor logging (SWCP 14.07), and unstable areas are excluded from timber sales (SWCP 14.05). During logging activities, sale area maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP 14.06). Log landings and skid trails are designated by the sale administrator (SWCP 14.08, SWCP 14.10) and actions are taken to control erosion during operations and before sale closure (SWCP 14.11-14.15, 14.18, 14.19). Logging is suspended when wet conditions may cause soil damage (SWCP 13.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996).

Fire has the potential to affect soils by consuming soil organic matter, altering the physical characteristics and increasing the solar energy absorbed by blackening the soil. Any of these may alter infiltration and erosion rates. However, none of the direct effects are likely to decrease the long term productivity if fire intensities and temperatures are kept low (Bayer, 1996). To ensure acceptable effects to the soil resource in the project area, soil suitability was determined and unsuitable areas were excluded from logging and fire. Soils and vegetation information was used to exclude areas from burning and define precautions in others (see Map L, App. 3). Soil and watershed considerations are used in prescribe burn planning (SWCP 18.02, SWCP 18.03). Standards and guidelines defined in the Forest Plan will be implemented during logging and burning to ensure soil quality standards are met. Burning will be done when conditions will limit the intensity of the fire, and when burning in large blocks the pattern will be mosaic (not continuous). Logging will include designation of skid trails and endlining, and will be done only when soil moisture conditions are suitable. Where detrimental effects to soil has occurred, either by soil disturbance, compaction or fire intensity, erosion control measures will be implemented. These include seeding disturbed areas, waterbarring skid trails, landings and roads, and scarifying (if necessary) and seeding areas where fire has exposed mineral soil. Monitoring on the Dixie National Forest has shown that when these measures are taken direct, indirect, and cumulative effects are within Soil Quality Standards, and long term productivity is maintained (Bayer, 1996). From soils and watershed information soils and water conservation practices (SWCP's) are applied routinely on the Dixie National Forest, although they are not listed as mitigations in this document . (SWCP's are listed Forest Service Handbook (FSH) 2509.22, a copy is in the project file.) SWCP's are implemented as timber sale contract provisions in timber sales (SWCP 14.01) and soil considerations in prescribe burn planning (SWCP 18.02). As part of the NEPA process, soils suitability was determined for tractor logging (SWCP 14.07), and unstable areas are excluded from timber sales (SWCP 14.05). During logging activities, sale area maps are used to designate soil and water protection needs including wetlands, seeps and riparian areas (SWCP 13.03, SWCP 14.03, SWCP

14.06). Log landings and skid trails are designated by the sale administrator (SWCP 14.08, SWCP 14.10) and actions are taken to control erosion during operations and before sale closure (SWCP 14.11-14.15, 14.18, 14.19). Logging is suspended when wet conditions may cause soil damage (SWCP 13.06). When these procedures and practices are followed, it has been determined that soil quality standards are met (Bayer, 1996 (Bayer, 1997)).

Proposed treatment areas occur on following soils:

Aspen harvest (and Aspen harvest and burn) - soil map units 528, 538, 539 and 545
Aspen maintenance - soil map units 523, 538, and 539
Aspen burn - soil map units 523 and 539
Mixed conifer burn - soil map units 523, 534, and 545
Oak burn - soil map units 523, 532, and 545
Pinyon/juniper burn - soil map units 429, 432, 524, 529, and 532
Ponderosa Pine Burn - soil map units 523, 532, 534, 538, and 545
Sage Burn - soil map units 432, 441, 477, and 524

On-Site Soil Erosion

Soil disturbance associated with tractor logging and the loss of canopy and ground cover in the burned areas will result in an unavoidable short term increase in on-site soil erosion. All treated areas will be within soil loss tolerance thresholds, even during the first year when erosion will be greatest (see table, section 4.2.5.1). The recommended mitigations as well as the relatively low percentage of watershed area harvested would ensure that the likelihood of increases in sediment to streams due to treatment will not be measurable (see section 4.5.6). The treatment areas proposed for burning will not result in soil disturbance, but will experience loss of ground cover and canopy cover which will result in some increase in on-site erosion. Resprouting in the aspen, pine, mixed conifer and oak types should result in good ground cover within one to two years; recovery in other vegetation types will take longer. None of the proposed burned treatment areas should result in severely burned soil conditions; if burn areas require, scarifying and seeding will be done to limit soil erosion.

Current erosion rates from the proposed treatment areas average .40 tons/ac/yr. Estimated erosion rates the first year following treatment are .75 tons/ac/yr. Erosion rates will decrease substantially each year thereafter. These erosion rates (both pre and post treatment are very low compared to the allowable 3 to 5 tons/ac/yr (soil loss tolerance threshold needed to maintain long term soil productivity).

Long Term Soil Productivity

Where prescribed burning is done a loss of most of the fine fuels which will occur resulting in a release of nutrients held in those fuels. The lower intensity fire associated with the proposal would result in leaving a sufficient amount of the larger fuels (large woody debris) for long term nutrient cycling.

Harvest using mechanical equipment will occur only in aspen stands where soils are suitable for timber sales (SWCP 14.07). Compaction and displacement associated with timber harvest in the aspen will be restricted primarily to the designated skid trail system (utilizing old skid trails from previous harvesting wherever possible). This mitigation will meet soil quality standards for long term soil productivity.

Forest Plan Consistency

This Proposed Action is consistent with the Land and Resources Management Plan of the Dixie National Forest would reduce the risk of high intensity fire effects on the soil resource due to catastrophic fire.

4.5.5.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON SOILS

The cumulative effects analysis area for long term soil productivity and on-site soil erosion is the project area itself. The intent is to ensure that proposed management on a project area does not result in reduced long term soil productivity. The cumulative effects analysis evaluates past management activities, the proposed management activity, and foreseeable future management activities. Off-site impacts of sediment are discussed in the hydrology section of the NEPA document. Long term soil productivity is not affected by adjacent projects. Cumulative impacts to soil productivity are the result of additional projects on the same piece of ground, i.e. additional soil erosion, increased compaction, displacement, etc.

Soil quality standards include threshold values for amount of surface organic matter, soil erosion rate and amount of soil disturbance (Bayer 1996). Increased on-site soil erosion rates associated with timber harvest are typically expected to be near natural levels (Bayer 1996). Direct, indirect and cumulative effects from past and ongoing activities are within soils quality standards, and long term productivity is maintained, when unsuitable soils are excluded of from management activities and mitigation measures are applied to offset impacts (Bayer 1996). Unsuitable soils have been excluded through the planning process (LBS Vegetation Treatment Project), and mitigations have been implemented through prescribe burn and timber sale planning and administration.

Previous projects on any of the proposed treatment areas are timber harvests of approximately 10 years ago more recently and prescribe burn activities under the LBS Vegetation Treatment Project. Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management harvest systems were used within most of the ponderosa pine. The timber harvests used a relatively high concentration of skid trails and logging roads. The Affected Environment, Soils section states that under current conditions none of the areas proposed for treatment exceed soil quality standards. Ongoing LBS Vegetation Treatment Projects include pinyon juniper prescribe burning along Hells Backbone Road and aspen harvest in the Road 566 area. Past and present management activities in the Project Area include road maintenance, livestock grazing, fuelwood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, trail riding with mountain bikes and Off Highway Vehicles (OHV's).

Other current management activities that are occurring within the Analysis Area include livestock grazing and dispersed recreational use (hunting, camping, fishing). The proposed mitigation of restricting skidders to skid trails, endlining, and restricting logging when soils are too moist, should result in acceptable cumulative impacts to the soil resource (i.e., minimize increase in compaction, displacement, puddling). As described above, there should be sufficient large woody debris left on site following treatment for long term nutrient cycling which will maintain soil productivity.

Foreseeable future management activities within the Analysis Area include LBS Vegetation Management Project and Sand Creek Soil Stabilization Project. The on-going Sand Creek Soil Stabilization Project is rehabilitating and reconstructing, and closing roads in the Sand Creek

watershed that were eroding and/or contributing sediment to streams due to improper location, lack of maintenance and/or lack of proper drainage. The project also incudes rehabilitation of gully systems in the vicinity of sand and Grimes Creek. The project has improved site productivity and reduced sediment delivery from gullied areas to Sand Creek.

4.5.5.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

Adverse Effects - There would be short term unavoidable increase in on-site soil erosion.

Short Term vs. Long Term Productivity - Burning will result in a release of nutrients immediately following the fire. There should be sufficient large woody debris left on site for long term nutrient cycling to maintain soil productivity.

Irreversible/Irretrievable Commitments - There would be no irreversible commitments to the soil resource. The portions of the treatment areas dedicated to permanent skid trails and landings are an irretrievable resource commitment (timber production is lost from these areas so long as they remain part of the transportation system servicing the area).

4.5.6 EFFECTS OF ALTERNATIVE 3 ON WATERSHED

4.5.6.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON WATERSHED

If Alternative 3 is implemented, the transportation and vegetative management activities summarized in Chapter 2 would be implemented. Transportation management would be implemented to close roads within the project area which are no longer necessary for administrative use. Seasonal closure would also be implemented on many roads within the project area. An OHV loop would be developed from the trailhead at the end of Road 566 around Haw's pasture and back through Road Draw road. Also included are actions included in section 4.2.6.1 under the heading, "Actions Common to all Action Alternatives" (where applicable). An area closure which would prohibit vehicular travel off of roadways and designated trails would also be implemented.

Water Quantity and Streamflow Regime

Trees have a direct influence over the amount of precipitation input available for stream flow because they transpire water, intercept precipitation which is then evaporated or sublimated directly back into the atmosphere, and modify the understory evapotranspiration environment (Kaufmann et. al, 1987). Any factor that reduces basal area or Leaf Area Index (LAI) of the forest will increase runoff to some degree (Shepperd et. al, 1991). Following fire or harvest, loss of ground cover and change in vegetation type (such as proposed in aspen or pinyon/juniper stands) will cause changes in infiltration and runoff. In aspen stands, where the objective of harvest and prescribed burning is to kill all the trees, the fire will also result in lower transpiration rates, especially during 3 years following the burn, but also in the longer term (Gifford, 1983). Where conifer has been killed in favor of deciduous trees (such as in aspen maintenance areas), more solar radiation will reach the snow surface and a more rapid snowmelt is expected (Dunne and Leopold, 1978), and transpiration will decrease (Gifford, 1983).

These changes may or may not increase streamflow or timing of streamflows, depending on treatment site locations and natural variations in precipitation, snowpack and rate of snowmelt. Streamflow changes also depend on the percentage of watershed area treated and watershed characteristics (Kendall, 4/1997). Studies on the effects of burning on water yield have been done mostly on high

intensity fires, and information on moderate or low intensity fires is scarce. Applying the analogy of a burn as a vegetative removal, studies of vegetative removal may be used to predict loss of vegetation due to fire. Considering only vegetative removal, it has generally been noted that 20% to 30% of a watershed must be harvested before a significant change in flow can be noted (Troendle, 1982). A watershed experiment in northern Utah which harvested 13% of the watershed using aspen clearcut showed no measurable increase in water yield (Johnston, 1984). A review of 94 catchment experiments concluded that when vegetative cover is removed, all but 1 resulted in an increase in water yield, however results were not consistent regarding that amount of the increase, length of treatment effect, or the effect on stream flow and timing or peak flows (Bosch and Hewlett, 1982).

In areas where tree cutting and prescribed fire which kills trees (see summary table, section 4.2.6.1), water yield is expected to increase. Burning which removes vegetation, and harvest, would reduce canopy closure and basal area. A decreased basal area would result in local increased water yield and may result in a small increase in runoff from the affected areas (Johnston, 1984, Troendle, 1982). Summer time evapotranspiration is influenced by forest type and structure (Troendle, 1982). At the watershed scale Alternative 3 would maintain present forest type and structural characteristics (summary table documents that less than 9% of the affected watersheds will undergo a vegetative change during the time span of the project). Vegetation in lower elevations (primarily P-J stands) utilize summer precipitation and stored water in the soil, and causes a depletion of excess soil water during the summer months (as evidence by the lack of springs, see app 3, map M). Following aspen treatment there is not expected to be a surplus of water available from harvest areas during summer months (Johnston, 1984). Therefore, the majority of the water yield increase from the project area would be during spring runoff, and would not be discernible from larger, natural variations (Troendle, 1982) (Johnston, 1984).

Water Quality

Burn Activities

The Environmental Consequences, Soils section predicts that prescribed burning on the proposed treatment areas will result in a loss of most of the fine fuels while leaving sufficient larger fuels required for nutrient cycling. Burning will not result in any direct soil disturbance, but will cause loss of ground cover and canopy cover, resulting in an increase in on-site erosion. This increase would be well within soil loss tolerance thresholds (see section 4.2.5). Following fire, erosion rates within burn areas will increase but long term elevated erosion rates are not expected (USDA Forest Service 1981, Elliot 1998). The amount of increase is extremely variable and is a function of the intensity of burn, slope, and proximity to streams. Water quality degradation may result from excessive amounts of nutrients, sediment or detritus (Kendall, 1/1997), and water quality standards may be exceeded in short term due to storm runoff. These effects will be minimized by conducting burn in accordance with burn plans (SWCP 18.02) and applying mitigations as part of the project plan (see Chapter 2, Mitigations section). Watershed monitoring on the Dixie National Forest has indicated that when prescribe burning is done within burn parameters, no short term adverse effects to hydrologic function and short term soil loss is minimal (Dixie National Forest, 1997; Dixie National Forest, 1998). Included in mitigations are the use of no burn areas (buffers) to limit sediment delivery to stream wetlands and riparian areas. Buffers, or Streamside Management Areas (SMAs), are widely recognized to be highly beneficial to water quality and aquatic habitat (EPA, 1993). Vegetation in SMAs reduces runoff and traps sediments generated from upslope activities, and reduces runoff before it reaches surface waters (same reference).

Harvest Activities

A summary of forest management practices from nationwide studies shows that forest practices have the potential to degrade the quality of water in streams by altering temperature, lowering dissolved oxygen concentrations, and increasing the concentration of nitrate-N and suspended sediment. In most cases, retention of buffer strips keeps the maximum increase in stream temperature to less than 2 degrees Centigrade. Depletion of streamwater oxygen is also rare in current harvesting operations. Minimizing inputs of fine organic debris into streams prevents creation of high biological oxygen demand. Nitrate concentrations may be increased by forest harvesting, but the summary concluded that harvesting does not degrade water quality by increasing nitrate concentrations in streamwater, with the possible exception of the Hubbard Brook forests (northern hardwood forests). The summary concluded that the major concern associated with silvicultural practices is suspended sediments. In this study it was concluded that use of Best Management Practices generally minimizes suspended sediment concentrations (Brinkley and Brown, 1993).

State of Utah, Best Management Practices applied to the harvest operations will be in the form of Soil and Water Conservation Practices (SWCP's). Monitoring of past timber sales on the Dixie National Forest during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation (Dixie National Forest, 1995; Dixie National Forest, 1996; Dixie National Forest, 1997; Dixie National Forest, 1998). The State has determined that use of SWCP's is adequate mitigation to reduce sedimentation (USFS, 1993). SWCP's are applied with an emphasis on skidding operations. Specific contract requirements which implement SWCP's are included in the timber sale contract provisions. In addition to the SWCP's listed in the Soils Section 4.2.5, which are designed to protect the soil resource. Additional SCWPs are routinely incorporated into timber sales on the Dixie National Forest which are not identified as mitigations in this document to protect water resources. These include designating springs, perennial stream courses, wetlands and seeps and on the timber sale map (SWCP 14.03) for protection during the sale (SWCP 13.03, SWCP 14.17).

Travel Management

During project implementation, construction of the OHV trail will contribute sediment to streams at stream crossings, including Bear Creek and tributaries to Bear Creek. Water quality standards may be exceeded for short periods of time during construction. A trail construction erosion control plan (SCWP 15.03) will be used to incorporated measures to minimize sediment contribution from construction activities. Measures will include specifications for timing of construction activities (SWCP 15.04), slope stabilization (SWCP 15.05), and control of permanent drainage (SWCP 15.07). Trails design at stream crossings will incorporate SWCP's, such as crossing stream at right angles and proper drainage at crossings; these measures will ensure sediment contribution from the trail will be minimized. Stream alteration permits for stream crossings will be acquired from the State where necessary by law. By incorporating SWCPs into project activities effects on the stream system will be limited to areas immediately below the proposed crossings, and trail construction will not adversely affect Beneficial Uses of water downstream; this is in compliance with State nonpoint source water quality laws.

Travel management activities other than OHV trail construction, including road closures, are expected to have an overall favorable effect on water quality in the long term. During and following soil disturbing activities erosion rates can be expected to increase until disturbed areas are stabilized, typically 3-5 years (USDA Forest Service, 1981). Utilizing BMPs, previously described in this section under "Action Common to all Action Alternatives" heading, will ensure that impacts to water quality are minimized and in compliance with State an Federal water quality laws.

Considering the above discussion, it is not expected that beneficial uses of water will be impacted and the action is in compliance with State an Federal water quality laws.

Forest Plan Consistency

Alternative 3 is consistent with the LRMP of the Dixie National Forest, more specifically implementing the project will not violate watershed related Standards and Guidelines described Chapter IV of the LRMP. Alternative 3, if implemented, would reduce the risk of cumulative watershed effects due to catastrophic fire.

4.5.6.2 CUMULATIVE EFFECTS OF THE ALTERNATIVE 3 ON WATERSHED

The cumulative effects area (CEA) for watershed analysis includes the drainages that receive water from within the Project Area, Sand Creek and Boulder Creek within National Forest Boundary. The CEA was chosen because of the natural boundaries of watershed resources. Flow from these drainages is used for culinary year round, and irrigation downstream during the months of May to October. During the remainder of the year this water flows into the Escalante River, then to the Colorado River.

Baseline cumulative effects analyses have been completed on the cumulative effects area using the Watershed Condition Rating (USDA 1993). Both Sand and Boulder Creeks are rated as good Watershed Condition Rating. The Watershed Condition Rating describes the relative condition (good, moderate, or poor) of the watershed, and provides some insight into the risk of cumulative effects (i.e. sedimentation, channel and aquatic habitat degradation, etc.) resulting from increased water yields, peak flows, and/or excessive erosion. The Watershed Condition Rating is based on road density and past vegetative disturbances (i.e. timber harvest, mortality, and fire).

Past and present management activities in the Project Area include road construction, road maintenance, timber harvest, livestock grazing, fuel wood gathering, Christmas tree cutting for personal use, and recreational pursuits such as hunting, fishing, camping, hiking, and trail riding with mountain bikes and Off Highway Vehicles.

Recreation access to McGath Lake is via poor road locations that have steep grades and that are located through the center of wet meadows. Past management activities including terracing and seeding gully areas are evident. The Affected Environment, Soils section of this document identifies several existing conditions within the cumulative effects area, including inadequately maintained and poorly located roads, gullies, and a slump. These have been addressed in a NEPA analysis, Sand Creek Soil Stabilization Project.

Timber harvests were done in the mid 1980's to combat a mountain pine beetle epidemic. Even-aged management systems were used within most of the ponderosa pine. Timber harvest activities resulted in construction of skid trails and logging roads. The Affected Environment, Soils section state's that under current conditions, none of the areas proposed for treatment exceed any of the soil quality standards.

Water and sediment yield is expected to increase slightly due to harvest activities. The water yield increase would occur during spring runoff, are not expected to be measurable compared to natural variations (section 4.2.6.2). Increased sediment yield from project activities are not expected to contribute measurably to existing sources within the watershed (section 4.2.6.2). The proposed

activities will not greatly affect the overall seral stage or roads density of the cumulative effects area (Sand and Boulder Creeks Watersheds), factors considered when determining the risk of cumulative watershed effects (USDA Forest Service, 1993). Considering these factors, it is unlikely that Alternative 3 will to cumulative watershed resource effects.
Monitoring of prescribed fire and past timber sales on the Dixie National Forest during the past several years has shown that SWCPs are effective in preventing and/or minimizing erosion and sedimentation (Dixie National Forest, 1995; Dixie National Forest, 1996; Dixie National Forest, 1997; Dixie National Forest, 1998). If erosion on disturbed sites is controlled or prevented, it is assumed that water quality degradation, associated with sedimentation, will be prevented. Implementation of Alternative 3 will have no long term impact on the hydrologic function or water quality within the watershed. Proper implementation of SWCPs will minimize soil loss and prevent any potential impacts to downstream water quality (Kendall, 1/1997, Kendall, 4/1997).

4.5.7 EFFECTS OF ALTERNATIVE 3 ON FISHERIES

4.5.7.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON FISHERIES

This alternative would not adversely affect the fisheries. This alternative would have similar beneficial effects as described for the Proposed Action.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired watershed condition for fish habitat.

4.5.7.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON FISHERIES

This alternative would not result in adverse cumulative effects to fisheries. This alternative would have similar effects as the Proposed Action Alternative, Alternative 1, and Alternative 2.

4.5.8 EFFECTS OF ALTERNATIVE 3 ON WILDLIFE

4.5.8.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON WILDLIFE

General Habitat Conditions

Though acres vary in some treatments, implementation of this alternative would result in similar habitat effects as the Proposed Action with introduced disturbances to the principal habitats. Within the **aspen habitat**, this alternative would provide the following habitat conditions:

- about 35% of the aspen habitat in a young age-class condition, (about 28% with high snag density; about 7% with low snag density.)
- about 19% of the aspen habitat to a relatively pure aspen stand of mature to old age-class condition, and
- about 46% of the aspen habitat left in mature to old age-class with varying amount of encroaching conifers.

Roughly 1,000 acres of young age-class habitat conditions would be provided. These acres of young age-class habitat condition would be achieved by burning 800 acres and by harvesting 204 acres;

snag densities would be respective to acres treated by burning and to acres treated by harvest. About 605 acres would be maintained in a relatively pure aspen habitat condition, benefitting wildlife species associated with that habitat condition.

Within the **mixed conifer**, **ponderosa pine**, **sagebrush**, **pinyon-juniper**, and **oak habitats**, the acreage treated and the effects of this alternative would be the same as for the Proposed Action.

Open Road Density

This alternative would affect wildlife in two manners. The first would be a decrease in open-road density to 1.0 mile per square mile. This would result in less disturbance to wildlife within the analysis area as compared to the No Action alternative.
Secondly, this alternative would increase the period of seasonal road and area closures in the Sand Creek drainage and the Sweetwater Creek drainage, by including all hunt periods, starting with bow hunting in August and ending after the last turkey hunt in late May. The area closure would not apply to over-the-snow motorized travel, as snowmobiles. Where snow accumulation would be sufficient for most snowmobile recreationists, most wildlife as deer, elk and turkey would not be in the same snow-depth zone, and consequently not harassed by such motorized activities. The effect of this extended road and area closure period would be a reduction in overall disturbance to wildlife from fall through spring.

Applying a seasonal closure on approximately three-quarter of a mile of Road Draw Road and OHV loop would not change the open-road density within the analysis area. In comparison to the Proposed Action, however, the addition of the seasonal closure on a portion of Road Draw Road and on the OHV loop would contribute to a larger area of the analysis area with overall less disturbance to wildlife during the fall and the spring when snow depths are shallow enough to accommodate area-use by wildlife, as deer, elk and turkey.

This alternative would reconstruct portions of Road Draw Road to eliminate damage being incurred to a wet meadow and other sites where seeps run onto the roadbed. The effects would be the same as described in Alternative 1.

Management Indicator Species

This alternative would have similar effects for Management Indicator Species as the Proposed Action. A slight variation would be the acreage (800 acres) of young age-class aspen habitat with a higher snag density left, resulting from burning those acres and the acreage (204 acres) of young age-class aspen which would have a lower snag density. The northern flicker would be the Management Indicator Species associated with snags. The variance in acreages of different snag densities would be a short-term effect in quantity of foraging structures, until the snags felled. After the snags fall, the long-term effects would be similar to the Proposed Action.

This alternative would be similar to the Proposed Action in providing deer and elk forage ratio of 31%. Alteration of age-class on "browse stands" acres would be 19% within a ten-year period.

Threatened and Endangered Species

This alternative would have the same no effects as the Proposed Action.

Sensitive Species

This alternative would not result in loss of species viability nor lead to future listing as threatened or endangered. This alternative would have similar effects for Sensitive-listed species as the Proposed Action. One slight variation would be the difference in acres of snag densities in the created young age-class aspen condition, as described above.

The three-toed woodpecker would be the only Sensitive-listed species associated with the snags remaining in the created young age-class aspen stands. Nesting territories would not change much, between the action alternatives, since the lower level of snag density on the harvest acres would still provide nesting structures. The variance in quantities of foraging structures might have a slight effect on nesting success of some individual nesting pairs of woodpeckers, though such would be difficult to assess, due to the higher percentage of aspen habitat acres retaining suitable foraging habitat conditions.

General Diversity Pattern

This alternative would be comparable to the Proposed Action with a general enhancement in diversity pattern resulting from the similar treatments. This alternative would have similar diversity in wildlife and plant species as the Proposed Action.

Non-Native Wildlife and Plant Species

This alternative would be the same as the Proposed Action in not promoting non-native wildlife species.

The effects of this alternative would be the same as for the Proposed Action with the addition of non-native plant species in the artificial seeding.

Wildlife Corridors

The effects of this alternative would be similar to the Proposed Action.

Forest Plan Consistency

This alternative would be consistent with the Land and Resources Management Plan of the Dixie National Forest and would move the analysis area toward a desired condition for wildlife and plant habitats.

4.5.8.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3

The area of influence for the cumulative effects is the same as for the other alternatives.

General Habitat Conditions

The effects of this alternative would be the similar to the Proposed Action, with a slight variance in aspen habitat treated.

Open Road Density

The effects of this alternative would be similar as for the Proposed Action for open-road density within the cumulative effects area. However, in comparison to the Proposed Action, the addition of the seasonal closure on portion of Road Draw Road and the OHV loop would contribute to a greater area within the cumulative effects area having reduced disturbance to wildlife caused by motorized traffic.

Management Indicator Species

The effects of this alternative would be similar to the Proposed Action.

Threatened and Endangered Species

The effects of this alternative would be the same as for the other action alternatives.

Sensitive Species

The effects of this alternative would be similar to the Proposed Action.

General Diversity Pattern

The effects of this alternative would be similar to the Proposed Action, with a variance in aspen acres treated.

Non-Native Wildlife and Plant Species

This alternative would be the same as the other alternatives in not promoting non-native wildlife species.

The effects of this alternative would be the same as for the Proposed Action alternative, which include addition of non-native plant species in artificial seeding.

Wildlife Corridors

The effects of this alternative would be the same as for the Proposed Action.

4.5.9 EFFECTS OF ALTERNATIVE 3 ON FIRE

4.5.9.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON FIRE

Fire Group 0

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 0, section 4.2.9.1).

Fire Group 1

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 1, section 4.2.9.1).

Fire Group 2

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 2, section 4.2.9.1).

Fire Group 3

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 3, section 4.2.9.1).

Fire Group 5

The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 5, section 4.2.9.1).

Fire Group 7

There are three different treatments prescribed for this FG, the aspen burn, the aspen maintenance, and the aspen regeneration harvest.

The aspen burn would encompass 800 acres. No cutting of conifer would take place east of the Sweetwater allotment fence, only burning, cutting and burning would take place west of this allotment fence. The effectiveness of the burn to remove the conifer component east of the fence may be reduced. The direct and indirect effects of this alternative and for this FG are then generally the same as the proposed action effects, (see proposed action, FG 7, aspen burn, section 4.2.9.1), except the acres east of the allotment fence may retain a small portion of the mixed-conifer component. This small component of mixed conifer would still be susceptible to fire with fire suppression personnel having a lower success rate in suppression activities.

With Alternative 3 the aspen maintenance treatment would treat 650 acres west of the Sweetwater allotment fence. The direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 7, aspen maintenance, section 4.2.9.1), except at a smaller scale, a larger portion would be susceptible to being moved to a different FG. This FG would be at a greater risk of a catastrophic stand replacement fire.

The aspen regeneration harvest would reduce the potential of an unwanted wildland fire within this treatment area. Approximately 204 acres would be treated. Treatments could occur west of the Sweetwater fence, or east of the allotment fence, but south of the Road Draw road. Fires may still occur within the area, however the spread potential would be reduced. A true FG 7 would be maintained, pure aspen stands are not considered to be highly combustible. In the short term these stands would be more susceptible to wildland fire. With this treatment additional fuels would be placed on the ground increasing the overall fuel loading. The effect of these additional fuels would be mitigated as much as possible by lopping limbs and tops to within 2 feet of the ground. Lopping results in faster fuel decomposition, and reduces the potential flame lengths in the event of a fire. The slash would diminish within 1-3 year period as the leafs and twigs dry and separate from the branches. The skid trails which would be utilized to remove the aspen would act as fuel breaks in the event of a fire. Fuels resulting from this treatment would not be continuous, so fire would not have a continuous fuel source. Overall, there would be a short-term increased fire hazard, but there would be a high level of fire risk reduction over the long-term.

Fire Group 10

No treatment is planned for this fire group under Alternative 3, the direct and indirect effects of this alternative and for this FG are the same as the Proposed Action effects, (see Proposed Action, FG 10, section 4.2.9.1).

Forest Plan Consistency

Under this Alternative, there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. Implementation of the fuels management and prescribed fire activities would move the area toward the Desired Conditions stated in the LRMP. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would also be realized.

4.5.9.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON FIRE

All Fire Groups

The cumulative effects of this alternative are similar to the Proposed Action cumulative effects, (see Proposed Action, Cumulative Effects, section 4.2.9.2). Implementation of Alternative 3 would reintroduce fire to 11,750 - 12,400 acres of land which treats 100 additional acres of aspen and 854 more acres of fuel. This is 440 acres less than the Proposed Action.

4.5.10 EFFECTS OF ALTERNATIVE 3 ON HERITAGE RESOURCES

Proposed activities would not impact known historic properties. Therefore, there will be no effects.

4.5.11 EFFECTS OF ALTERNATIVE 3 ON SOCIO/ECONOMICS

4.5.11.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON SOCIO/ECONOMICS

Implementation of this alternative would result in the removal of approximately 135 MBF of conifer sawtimber and 760 MBF of aspen. Total stumpage value to the Forest Service is estimated at $35,724.48. The design of these treatments would favor Stoltze Aspen Mill in Sigurd, Utah who may or may not subcontract the logging with local (Garfield and Wayne County) loggers. The conifer volume which is incidental to the aspen treatments would most likely be processed by local sawmills.

The design of the various burning and mechanical treatment projects would improve game habitat, particularly in terms of turkey, deer and elk, thereby potentially increasing the recreational hunting opportunities over the long term as measured by the total acres of treatment, (12,952-13,602) acres. Treatments in the pinyon-juniper and sagebrush may reduce deer feeding in the Salt Gulch and Boulder ranches and thereby reduce deer depredation permits. Overall, the various fuel treatments would reduce the risk to catastrophic fire and their suppression costs.

Economics

The costs of implementing this alternative are as follows:

NFMA/NEPA planning	$66,500.00
Sale administration	$14,776.36
Sale Preparation	$34,776.86
Survival/Stocking Exams	$1,336.20
Road Improvements	$ 5,000.00
Road Closure Gates	$ 5,550.00
Sagebrush Burning	$5,625.00
Pinyon-Juniper burn	$100,750.00
Oak burn	$18,050.00
Ponderosa pine burn	$630,000.00
Mixed Conifer burn	$29,250.00
Aspen burn	$24,800.00
Total Costs	$936,414.42

The benefits would include money generated from the timber sale receipts which is estimated at $35,724 with the removal of 896 MBF of forest product. Benefit cost ratio is .46. Based on the 1997 TSPIRS report for the Dixie National Forest, the timber sale would provide 14.2 jobs, produce $710,161.32 in local income, and produce $106,499.11 in federal income tax revenue.

4.5.11.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON SOCIO/ECONOMICS

The scope of the cumulative effects analysis includes the Garfield and Wayne Counties's local economies. The release of 896 MBF of forest products could provide short term security to local small operators. Of greater importance is the supply of aspen logs to the developing aspen industry in Sigurd, Utah which has been recently purchasing aspen off of the Dixie National Forest.

4.5.12 EFFECTS OF ALTERNATIVE 3 ON AIR QUALITY

4.5.12.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON AIR QUALITY

Parameters

There are five parameters important to the determination of air quality and its potential effects. These include amount of airborne particulates, gaseous pollutants, visibility, Prevention of Significant Deterioration (PSD) designation, and proximity to residential private subdivisions or Class I airsheds.

Existing Airborne Particulates

The direct and indirect effects on existing airborne particulates under this alternative are the same as the Proposed Action, (see the Proposed Action, existing airborne particulates, section 4.2.12.1).

Fire Group 0

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 0, section 4.2.12.1).

Fire Group 1

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 1, section 4.2.12.1).

Fire Group 2

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 2, section 4.2.12.1).

Fire Group 3

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 3, section 4.2.12.1).

Fire Group 5

The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 5, section 4.2.12.1).

Fire Group 7

Prescribed burning would take place on 800 acres in this fire group. Based on 800 acres being burned with 5 tons per acre being consumed and an emission factor of 25 lbs. per ton, 50 tons of particulate matter would be produced (SMG, NWCG, Ferry, et. al.,1985). Burning would only be implemented when: all state laws, and regulation could be met, when present and foreseeable future burning conditions allows for the objectives of the burn to be met, and when implementation wouldn't contradict with any mitigation measures such as: wildlife, air quality and etc.(refer to Chapter 2, Section 2.4). Emissions from the burn would not be substantial as most of the emissions would be produced within the first 6 hours of ignition each day, and would then dramatically decrease each day. It is estimated that a small amount of residual smoke emissions would be evident for up to 3-5 days following each day of ignition. Implementation of the burn could take up to four years to complete. The Utah Smoke Management Plan would be followed to assure that burning occurs only during days with good dispersion factors.

Within the 650 acres of aspen maintenance no burning would take place. However there would be a small increase in the amount of carbon monoxide and fugitive dust produced, as result from conifer removal. This increase would be short term, and only take place while the conifer is being removed.

Within the 204 acres of aspen regeneration harvest no burning would take place. Through conifer removal there would be slight increase in the amount of carbon monoxide and fugitive dust. This increase would be short term, and only take place while the aspen is being removed.

Fire Group 10

Within this fire group no action would take place, The direct and indirect effects under this alternative, and for this fire group are the same as the Proposed Action, (see the Proposed Action, FG 10, section 4.2.12.1).

Emission Production and Duration

The direct and indirect effects on emission production and duration under this alternative are the same as the Proposed Action, (see the Proposed Action, emission production and duration, section 4.2.12.1).

Gaseous Pollutants

The direct and indirect effects on existing gaseous pollutants under this alternative are the same as the Proposed Action, (see the Proposed Action, gaseous pollutants, section 4.2.12.1).

Visibility

The direct and indirect effects on visibility under this alternative are the same as the Proposed Action, (see the Proposed Action, visibility, section 4.2.12.1).

Prevention of Significant Deterioration (PSD)

The direct and indirect effects on prevention of significant deterioration under this alternative are the same as the Proposed Action, (see the Proposed Action, PSD, section 4.2.12.1).

Proximity to Private Subdivisions or Class I Airsheds

The direct and indirect effects on proximity to private subdivisions or class I airsheds under this alternative are the same as the Proposed Action, (see the Proposed Action, proximity to private subdivisions or class I airsheds, section 4.2.12.1).

Forest Plan Consistency

Under this Alternative there would be no conflict with the Dixie National Forests Land and Resource Management Plan Standards and Guidelines. Desired Conditions and Need for Change listed within the LRMP, for fuels management, air quality, and prescribed fire would be met. The opportunity to move the analysis area towards the desired future condition as described in chapter 1 would be met.

4.5.12.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON AIR QUALITY

The cumulative effects of this alternative are generally the same as the Proposed Action, (see Proposed Action, air quality, cumulative effects, section 4.2.12.2), except that a total of 1,234.6 tons of particulate matter would be produced from prescribed fire activities. These prescribed fire activities would be spread over a five year period.

4.5.13 <u>EFFECTS OF ALTERNATIVE 3 ON LIVESTOCK GRAZING</u>

4.5.13.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON LIVE STOCK GRAZING

The greatest potential effect from Alternative 3 would develop from the regeneration treatments within the aspen stands, both fire and harvest methods. These areas treated would attract livestock especially when adjacent to key areas. If construction of a fence is necessary to protect aspen regeneration in the burn unit above Haws Pasture, then approximately 500-600 acres would be lost

temporarily (3-5 years) from transitory grazing. However, if the project is implemented in a 1-2 year period, the extent of the treatments will diffuse grazing intensities to the extent that a fence should not be necessary. Treatments in the sagebrush, PJ, and oak could also attract heavier grazing intensities and would be regulated by the standards and guidelines of the term grazing permit. Some areas, such as Pretty Tree Bench are not grazed, and should not receive additional grazing pressure. Treatments in the ponderosa pine and mixed conifer should not effect grazing activity.

Livestock will benefit over the long term from these treatments from the increase in forage quantity and quality by the total acres of treatment, 12,952-13,602 acres. Maintenance for aspen stands versus conifer conversion will result in higher forage production. Studies have shown that within aspen stands (Harniss, 1982), increases of 20 basal area/acre of conifer trees can reduce understory production by more than half. Furthermore, conifer conversion will reduce water yields, and reduce plant diversity. Therefore livestock will benefit from the 1,004 acres of aspen regeneration and 650 acres of aspen maintenance. However, these changes will not result in changes to livestock numbers.

4.5.13.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON LIVESTOCK GRAZING

In addition to the cumulative effects described in the Sand Creek Soil Stabilization Project (EA, chapter 4, pages 101-102), and LBS Vegetation Treatment Project (EA, Chapter 4, pages 68-69) there would be an increase in quality of forage commensurate with the total acres of treatment, 12,952-13,602.

4.5.13.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ REGULATIONS

The Proposed Action would cause no adverse effects nor any irreversible/ irretrievable commitments in relation to Livestock Grazing.

4.5.14 EFFECTS OF ALTERNATIVE 3 ON SPECIAL USES AND ON MINERALS

4.5.14.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON SPECIAL USES AND ON MINERALS

This alternative would be similar in any effects as the Proposed Action Alternative, Alternative 1 and Alternative 2.

4.5.14.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON SPECIAL USES AND ON MINERALS

This alternative would be similar in effects as the Proposed Action Alternative, Alternative 1 and Alternative 2.

4.5.15 EFFECTS OF ALTERNATIVE 3 ON TRAVEL MANAGEMENT

4.5.15.1 DIRECT AND INDIRECT EFFECTS OF ALTERNATIVE 3 ON TRAVEL MANAGEMENT

The effects of implementing Alternative 3 on travel management would be a result of the amount of road reconstruction, the amount of roads remaining open to motorized travel and the amount of roads

on which the type of use is being altered. The direct and indirect effects of the management activities are disclosed in the proceeding resource sections.

Travel management activities under Alternative 3 are the same as those identified for the Proposed Action with the following exception. Forest Road 514 would be seasonally closed to motorized travel between August 20 and June 1 of each year. Consequently there would be no opportunities for motorized travel on the OHV Loop during the fall and spring. However, the relocation of that portion of Forest Road 514 which is located in the meadow would be done. This would result in 52.9 miles of road open to travel by motorized travel. Appendix 3, Map K graphically depicts the roads which would remain open, those which would be seasonally closed and the OHV Loop.

Approximately 17,500A acres within the project area would be open to travel by snow machines.

Alternative 3 is consistent with the direction provided in the Land and Resource Management Plan for the Dixie National Forest. Implementation of Alternative 3 would move the analysis area towards the Desired Future Condition as described in Chapter 1.

Road Density

The open road density within the analysis area would be 1.0 miles per square mile.

Table 4.5

Purpose and Need Comparison Table

	Wildfire Risk Reduction	Big Game Winter Range Enhancement	Vegetation Structural Stage Development (PFC)	Travel Management
No Action	Large fire risk remains, predominately in the ponderosa pine type with a 98% chance of having one fire reach 1,000 acres in size. The estimated suppression cost over 40 years is $9 1/2 million (discounted)	No change in winter range forage for big game.	Large structural imbalances remain, primarily within the pinyon/juniper types, oak types and aspen types. Early seral vegetation conditions are limited across the landscape.	Area remains open unless designated closed. Past road management decisions do not change. Road Draw Road remaining open (RS2477 assertion).
Proposed Action	Large fire risk is substantially reduced across all fire groups. Burn intensity is also reduced	Increases, and enhances Big Game winter forage on 3000-3500 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 3000-3500 acres of pinyon/juniper into early seral. Moves 1002 acres of aspen into early seral by burning and harvesting. Moves 450-500 acres of oak into early seral.	Area is closed with designated open routes. A designated OHV trail is constructed. Road Draw Road remains open (RS2477 assertion).
Alternative 1	Large fire risk is substantially reduced across all fire groups. Burn intensity is also reduced.	Increases and enhances Big Game winter forage on 3000-3500 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 3000-3500 acres of pinyon/juniper into early seral. Moves 1000 acres of aspen into early seral by burning. Moves 450-500 acres of oak into early seral.	Area is closed with designated open routes. Road Draw Road reconstructed; Road Draw Road remains open (RS2477 assertion). A designated OHV trail is constructed.
Alternative 2	Large fire risk is reduced moderately throughout the fire groups. The risk persist on over 3,000 acres more than the Proposed Action.	Increases and enhances Big Game winter forage on 300-350 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 300-350 acres of pinyon/juniper into early seral. Moves 591 acres of aspen into early seral (burn and harvest). Moves 450-500 acres of oak into early seral.	Area is closed with designated open routes. Road Draw road closed to motorized travel (RS 2477 assertion). OHV trail is not designated or constructed.
Alternative 3	Large fire risk is substantially reduced across all fire groups. Burn intensity is also reduced.	Increases and enhances big Game winter forage on 3000-3500 acres of pinyon/juniper, and 200-250 acres of sagebrush.	Moves 3000-3500 acres of pinyon/juniper into early seral. Moves 859 acres of aspen into early seral (burn and harvest). Moves 450-500 acres of oak into early seral.	Area is closed with designated routes open. Road Draw Road is reconstructed with portions seasonally closed (RS2477 assertion). OHV trail is designated and constructed, and open form 6/1 to 8/20.

4.5.15.2 CUMULATIVE EFFECTS OF ALTERNATIVE 3 ON TRAVEL MANAGEMENT

Travel management activities directly and indirectly effect the other resources within the analysis area.

Effects of sedimentation due to road reconstruction, road closures, or changes in use are discussed in the proceeding resource sections of this document.

4.5.15.3 OTHER EFFECTS ANALYSIS REQUIRED BY CEQ

There would be no irretrievable or irreversible commitment of resources with the implementation of Alternative 3. The area and road closure decisions are not irretrievable and could be reversed. The creation of the OHV Loop could also be reversed by reclaiming the trail location and rehabbing the site to its original condition.

4.6 COMPLIANCE SECTION WITH OTHER LAWS AND REGULATIONS

4.6.1 FOREST PLAN CONSISTENCY

As disclosed in Chapter One, this EIS is tiered to the Final Environmental Impact Statement for the Dixie National Forest Land and Resource Management Plan (LRMP). It documents the analysis in the second level of planning. Changes in land use designation which have been established in the LRMP were not evaluated in this analysis.

In the LRMP, the National Forest land within the Dixie National Forest has been divided into Management Areas which differ from each other in resource emphasis. The Management Areas that fall within the Pretty Tree Bench Vegetation project area were fully discussed in Chapter One of this EIS; spatial location of these Management Areas can be found in appendix 3, map E, of this EIS.

Disclosures within this EIS and project file resource reports clearly display that implementation of the Proposed Action, or action alternatives to the Proposed Action, and mitigation measures, would be consistent with the LRMP standards and guidelines, goals and objectives, and desired future conditions.

4.6.2 NATIONAL FOREST MANAGEMENT ACT

Compliance with the National Forest Management Act (NFMA) is clearly displayed in resource discussions found within this EIS. A detailed discussion of NFMA compliance points, as outlined in the Code of Federal Regulations (CFR) 36 CFR 219.27(a) through 219.27(g) can be found within each resource report found in the project file. Because this EIS involves vegetative management treatments NFMA compliance items covered under 36 CFR 219.27(b) "Vegetative Manipulation",36CFR 219.27(c) "Silvicultural Practices", and 36 CFR 219.27(d) "Even-aged Management" will be described below.

Vegetative Manipulation

219.27 (b)(1): "Be best suited to the multiple use goals established for the area with potential environmental, biological, cultural resource, aesthetic, engineering, and economic impacts, as stated in the regional guides and forest plans...".

In Chapter Four, each resource is evaluated as to how each alternative addresses multiple use goals that are inherent in the Forest Plan standards and guides (S&G). As described in these effects discussions, all action alternatives comply with Forest Plan S&G. The Forest Plan S&G are a product of the Regional guides and these S&G's were developed specifically for the Dixie National Forest.

219.27 (b)(2): "Assure that lands can be adequately restocked as provided in paragraph (c)(3) of this section, except where permanent openings are created for wildlife habitat improvement, vistas, recreation uses and similar practices."

No permanent openings are being created under any alternative. There are regeneration harvest treatments prescribed in aspen areas which provide reasonable assurances they will regenerate as described in Chapter 4, Vegetation.

219.27 (b)(3): "Not be chosen primarily because they will give the greatest dollar return or the greatest output of timber, although these factors will be considered."

While economics and outputs were considered in the decision process, other factors related to vegetation management and protection of resources within the project area as described in Chapters Three and Four will be the primary focus to determine the best action to implement. The reasons for the decision will be fully described in the Record of Decision.

219.27 (b)(4): "Be chosen after considering the effects on residual trees and adjacent stands."

Effects on other stands and residual trees are discussed in Chapter Four, "Vegetation". Actions proposed to be implemented under each alternative are believed to best meet project purpose and need while meeting issues that drove alternative formulation.

219.27 (b)(5): "Avoid permanent impairment of site productivity and ensure conservation of soil and water resources."

SWCPs implemented in project design and contract initiation are designed to minimize impacts to site productivity and ensure conservation of soil and water resources. These are discussed in Chapter Four, "Soils" and "Hydrology". Contract clauses will be used that implement SWCPs, such as directional felling, designated skid trails, endlining, etc.

219.27 (b)(6): "Provide the desired effects on water quantity and quality, wildlife and fish habitat ... and other resource yields".

The analysis of the Proposed Action, and Action Alternatives, show that there would be no measurable change to water quantity in any of the affected watersheds when compared to natural variations. Affects to water quality and fish habitat would be negligible due to the implementation of the required SWCPs.

219.27 (b)(7): "Be practical in terms of transportation and harvesting requirements, and total cost of preparation, logging, and administration."

The transportation and harvest method described are capable of being implemented, based on past district experience with similar treatments .

Silvicultural Practices

219.27 (c)(1): "No timber harvesting shall occur on lands classified as not suited for timber production pursuant to 219.14 except for salvage sales ... These lands shall continue to be treated for reforestation purposes if necessary to achieve the multiple-use objectives of the plan."

This has been discussed under the "Forest Land Suitability" section within Vegetation, Chapters Three and Four. Based on discussions in this section, all harvest activities proposed are in full compliance with this management requirement.

219.27 (c)(2): "The selected sale schedule provides the allowable sale quantity for the first planning period. Within the planning period, the volume of timber to be sold in any one year may exceed the annual allowable sale quantity so long as the total amount does not exceed the allowable sale quantity.

The volume to be sold under the Proposed Action or other Action Alternatives would contribute to the allowable sale quantity (ASQ) for the first planning period for the Forest Plan. Sale of any volume proposed under the Proposed Action or Action Alternatives would not result in exceeding the ASQ for the planning period.

219.27 (c)(3): "When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exists to adequately restock the lands within 5 years after final harvest. Research and experience shall be the basis for determining whether the harvest and regeneration practices planned can be expected to result in adequate restocking ...".

NFMA requires that timber be harvested from National Forest Systems lands only where there is assurance that such lands can be adequately restocked within 5 years of final harvest (16 U.S.C. 1604).

Under the Proposed Action, and other Action Alternatives, various levels of aspen clearcutting are proposed. Based on past district experience, as well as research, clearcutting has been proven to be the optimum method of regeneration (Jacobs/Swale Vegetation Management Project, FEIS, Chapter IV, page 68) .

Monitoring would be used to assess the success of regeneration efforts following project completion. Desired results and forest plan standards would be specifically stated in the detailed silvicultural prescriptions written for each area. .

2219.27(c)(6). "Timber harvest cuts designed to regenerate an even-aged stand of timber shall be carried out in a manner consistent with the protection of soil, watershed, fish ...resources, and the regeneration of the timber resource".

Even-aged treatments are proposed under the Proposed Action or other Action Alternatives. However, as discussed in Chapters Three and Four, the SWCP's are designed to protect soil, water, and instream resources. Pertinent SWCP's are harvest restrictions in critical soil and watershed areas, wet condition restrictions, designated skid trails, and construction of erosion control devices.

Even-Aged Management - Optimization Of Clearcutting. The National Forest Management Act states that clearcutting is to be used on National Forest System lands only where it is determined to be the optimum method.

The Dixie National Forest has interpreted this requirement to mean that clearcutting would be used only where it is consistent with the Forest Plan standards and guidelines, and where it would accomplish Forest Plan objectives that cannot be accomplished through other harvest methods.

In the aspen regeneration areas, current literature as well as district experience, indicates that clearcutting aspen clones provides the best conditions for successful regeneration.

Appropriateness Of Even-Aged Management: The National Forest Management Act (NFMA) places special requirements on the use of even-aged silviculture systems on National Forest Systems lands. This is contained in NFMA (16 USC 1604 (g)(3), (F) and (i)) which states that "cuts designed to regenerate an even-aged stand of timber would be used as a cutting method ... only where ... such cutting is determined to be appropriate, to meet the objectives and requirements of relevant land management plan".

Even-aged treatments are proposed under the Proposed Action or other Action Alternatives. These treatments have been proven to be the best method of regenerating aspen and are designed to meet the objectives described for this project (Chapter I). Effects of this treatment have been fully disclosed under each resource in Chapter IV.

219.27 (d)(1): "Openings shall be located to achieve the desired combination of multiple-use objectives ... Regional Guides shall provide guidance on dispersion of openings As a minimum, openings in forest stands are no longer considered openings once a new forest is established ... Forest plans may set forth variations to this minimum based on site-specific requirements for achieving multiple-use objectives ... Regional guides shall provide guidance for determining variations to this minimum in the forest plan ...".

Refer to the discussion under 219.27 (d)(2), below.

219.27 (d)(2): "Individual cut blocks, patches, or strips shall conform to the maximum size limits for areas to be cut in one harvest operation established by the regional guide ... This limit may be less than, but will not exceed, ... 40 acres for all other forest types except as provided in paragraphs (d)(2)(i) through (iii) of this section. (i) - Cut openings larger than those specified may be permitted where larger units will produce a more desirable combination of net public benefits ... (ii) - Size limits exceeding those established in paragraphs (d)(2) and (d)(2)(i) of this section are permitted on an individual timber sale basis after 60 days' notice and review by the Regional Forester ... (iii)- The established limit shall not apply to the size of areas harvested as a result of natural uncharacteristic condition such as fire, insect and disease attack, or windstorm."

The Regional Guide for the Intermountain Region (1984), page 3-21, states "An opening created in the Forest by application of even-aged management that exceeds 40 acres will require Regional Forester approval. Where such openings exceed 60 acres in size to produce a more desirable combination of net public benefits, they will be subject to a 60-day public review, except where a catastrophe exists. Regional Forester review and approval is required for harvesting larger units under catastrophic conditions. Appropriate public notice will also be given .... (e) Evidence of a catastrophic condition must be reviewed and approved by the Regional Forester, if created openings will exceed 60 acres.

Although even-aged treatments are proposed under the Proposed Action and other Action Alternatives, using clearcutting, no openings will exceed 40 acres.. For a complete discussion of the remaining 36 CFR 219.27(a) through (g) items not discussed above, refer to the resource reports in the project file.

4.6.3 CLEAN WATER ACT

The Clean Water Act (CWA) requires each state to implement its own water quality standards. The State of Utah's Water Quality Antidegradation Policy requires maintenance of water quality to protect existing instream Beneficial Uses on streams designated as Category 1 High Quality Waters. All surface waters geographically located within the outer boundaries of the Dixie National Forest, whether on private or public lands are designated as High Quality Waters (Category 1). This means they will be maintained at existing high quality. New point sources will not be allowed, and non-point sources will be controlled to the extent feasible through implementation of Best Management Practices (BMPs) or regulatory programs (Utah Division of Water Quality 1994). The State of Utah and the Forest Service have agreed through a 1991 Memorandum of Understanding to use Forest Plan Standards & Guidelines and the Forest Service Handbook (FSH) 2509.22 Soil and Water Conservation Practices (SWCPs) as the BMPs. The use of SWCPs as the BMPs meet the water quality protection elements of the Utah Nonpoint Source Management Plan.

The Beneficial Uses and High Quality of water in the streams draining the Project Area would be maintained during and following project implementation through the proper implementation of BMPs (SWCPs) as described in Chapter Two (mitigation).

4.6.4 EXECUTIVE ORDER 11990 OF MAY, 1977

This order requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In compliance with this order, Forest Service direction requires that an analysis be completed to determine whether adverse impacts would result.

The location of wetlands in the Project Area were identified in the delineation and inventory of critical watershed areas. No ground disturbing activities will occur within 50 feet of any wetland, seep, or spring. These areas have been identified on the critical watershed map. Impacts from adjacent or nearby areas will be prevented through implementation of SWCPs as described in Chapter 4. With a 50 foot buffer area around any wetlands, seeps, or springs and implementation of SWCPs, any of the alternatives would be in compliance with Executive Order 11990.

4.6.5 EXECUTIVE ORDER 11988 OF MAY, 1977

This order requires the Forest Service to provide leadership and to take action to (1) minimize adverse impacts associated with occupancy and modification of floodplains and reduce risks of flood loss, (2) minimize impacts of floods on human safety, health, and welfare, and (3) restore and preserve the natural and beneficial values served by flood plains. In compliance with this order, the Forest Service requires an analysis be completed to determine the significance of Proposed Actions in terms of impacts to flood plains.

No developments will be constructed within floodplains under all alternatives. No ground disturbing activities will be allowed within 50 feet of any stream channel (ephemeral, intermittent, and/or perennial), except at road crossings. Impacts related to road crossings will be minimized or prevented through implementation of SWCPs. All of the proposed alternatives would be in compliance with Executive Order 11988.

4.6.6 ENDANGERED SPECIES ACT OF 1973, AS AMENDED

Based on Discussions in Chapters Three and Four concerning threatened and endangered plant and wildlife species; correspondences with USFWS; and detailed discussions contained in the Biological Assessment located in the project file, it has been determined that there would be no adverse effects to populations of threatened, endangered, or proposed wildlife or plant species relative to the Proposed Action or any alternative.

4.6.7 AMERICAN ANTIQUITIES ACT OF 1906 AND HISTORIC PRESERVATION ACT OF 1966

Based on the discussions in Chapters Three and Four concerning Heritage Resources, and project file documentation , it has been determined that there will be no measurable effects to any Historic Properties relative to any of the alternatives.

4.6.8 CLEAN AIR ACT, AS AMENDED IN 1977

Based on discussions in Chapter Three and Four concerning Air Quality, it has been determined that there would be no measurable effects to air quality in class I or II airsheds relative to any of the alternatives.

4.6.9 EXECUTIVE ORDER 12898 OF FEBRUARY, 1994

This order requires the Forest Service to take action to the extent practicable and permitted by law , to make achieving environmental justice part of its mission by identifying and addressing as appropriate, disproportionately high and adverse human health effects, of its programs policies and activities on minority populations and low-income populations in the United States and territorial possessions.

In compliance with this executive order, the Dixie National Forest, through intensive scoping and public involvement attempted to identify interested and affected parties, including minority and low-income populations for this project. The Forest defined a range of alternatives to be evaluated and analyzed the consequence of the alternatives on the quality of the human environment. A Notice and Comment Period (36 CFR 215.3(a) and 36 CFR 215.6(a)) is required for 30 days following publication of the legal notice in the specified newspaper of general circulation (36 CFR 215.5(a)), which is the Spectrum Newspaper, St. George, Utah.
A 45-day public comment period is required following the publication of the Notice of Availability of the DEIS in the Federal Register.

Low income populations were identified during public involvement activities in numerous small communities in Garfield County, immediately surrounding the project area.

This analysis does not identify any adverse or beneficial effects unique to minority or low income populations in the identified communities.

4.6.10 GRAND STAIRCASE - ESCALANTE NATIONAL MONUMENT

The southern border of the project boundary is common to the boundary of the Grand Staircase - Escalante National Monument (GSENM) for approximately 4.75 miles. Generally, this border is

composed of sagebrush, canyons, or PJ. Based on effects detailed in Chapter 4, there will be some effects on GSENM by the various alternatives, as summarized below.

No Action - No management actions are proposed. Existing conditions, uses, and trends described in Chapter 3 within the analysis area would continue. Therefore, there would not be any effects on GSENM.

Action Alternatives - Proposed management activities; prescribed fire, tree cutting, and travel management would influence to some degree, the GSENM. Based on the impacts on Visual Quality (Section 4.2.4.1.), implementation of the treatments would result in subtle changes in the vegetation patterns in the short term while enhancing visual diversity over the long term. The most observed changes from within the GSENM, would be sagebrush burning along the boundary. Prescribed fire would result in naturally appearing openings distributed in a mosaic pattern across the area. Treatment would be most noticeable in the first 2-3 years after burning, until establishment of new plant growth dominates. Timber harvest would not be apparent, given the distance (> 7 miles), terrain, and size of openings.

It is anticipated that there will be some smoke dispersal into the GSENM (Section 4.2.9.2.). Most smoke will be produced in the first 6 hours of ignition. Some smoke may be visible for up to 6 days following ignition. The closest treatment, in the sagebrush, would produce most of the smoke within 3 hours. Overall, ignition methods are designed to limit smoke emissions as well as comply with the Clean Air Act.

Water and sediment rates into the GSENM would increase slightly as a result of the proposed treatments. Water yield increases would occur during peak flows associated during spring runoff and would be difficult to discern from natural streamflow variations. Sedimentation increases downstream are not anticipated to increase measurably, having little effect on GSENM. Implementation of the Travel Management Plan would limit dispersed camping opportunities immediately adjacent to GSENM, as well as throughout most of the analysis area.

4.6.11 USFS INTERIM ROAD RULE

The implementation of the interim rule became effective on March 1, 1999. This interim rule suspended road construction and road reconstruction within certain areas of land that are administered through the National Forest System. All alternatives which were analyzed in detail examined the language of the interim rule. The interim road rule will have no effect of any of the alternatives considered in detail.

No Action Alternative: No road construction or road reconstruction is proposed with this alternative. The interim rule has no effect.

Proposed Action Alternative: There is no road construction or road reconstruction associated with this alternative. The alternative will develop an OHV trail which will be less than 50 inches wide. By definition in the interim rule (36 CFR Part 212), a road is a travel way over 50 inches wide. Development of this trail is therefore not subject to the interim rule. The interim rule has no effect on this alternative.

Alternative 1: This alternative does propose road reconstruction on a section of the Road Draw Road. This alternative will develop an OHV trail which will be less than 50 inches wide. By definition in the interim rule (36 CFR Part 212), a road is a travel way over 50 inches wide. A classified

road is a road constructed or maintained for long-term highway vehicle use. Implementation guides from the Regional Office (Bob Harmon 2/23), further describe "classified roads" as having a road number, and being identified on the forest road inventory prior to 2/12/99. "Classified roads" also include those roads identified for long term use. Further, highway vehicles are not passenger vehicles, but rather any vehicle that is licensed for the road and which travel highways. Given this description, Road Draw Road is a "classified road", and reconstruction work on classified roads is permitted. Garfield County has also stated that they believe this is a "Public Road", and is under the jurisdiction of the County. Therefore, this work is not subject to the rule, and the interim rule has no effect on this alternative.

Alternative 2: This alternative proposes no road construction or road reconstruction, and will not develop the OHV trail. The interim rule has no effect on this alternative.

Alternative 3: This alternative does propose road reconstruction on a section of the Road Draw Road. This alternative will develop an OHV trail which will be less than 50 inches wide. Given the descriptions described in Alternative 1 and the associated findings, this work is not subject to the rule and will not effect this alternative.

Roadless Area Policy

In October, 1999, President Clinton directed the Forest Service to develop a proposal to protect over 40 million acres of inventoried roadless areas on National Forests. The Forest Service is beginning to act on this assignment, and the issue will be addressed in an open and public forum. On October 14, 1999 the Chief of the Forest Service, Mike Dombeck, issued a letter to all employees regarding this National direction. Within the letter, the Chief has said that "This letter will be used as policy direction for this announcement".

The Pretty Tree Bench proposal does not propose road construction of any kind. Proposed timber harvest activities are not located within inventoried roadless areas. Because the proposal to protect 40 million acres of inventoried areas has not yet been developed, because analysis and documentation regarding the proposal has not been completed, and because this specific proposal action does not include road construction/reconstruction or timber harvest within inventoried roadless areas, Part I of the Roadless Area Policy announcement will not have an effect on the Pretty Tree Bench Vegetation Project. Should Part II, when it is developed, provide new information specific to this proposal; changes will be appropriately incorporated.

4.6.12 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Irretrievable resource commitment applies to losses of production, harvest, or commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irretrievable Resource Commitments

Vegetation: Where permanent roads are constructed or reconstructed and the soil displaced, there is an irretrievable loss of the type of vegetation that occurs. For temporary roads, skid trails and landings, vegetation is restored on the disturbed areas, but the type of vegetation may be changed

from timber to grasses and legumes if these areas are to be part of the permanent transportation system.

Social/Economic: Where there is no wood fiber recovered, such as No Action, there would be an irretrievable loss in income and employment in the local economy for a short period of time, or, until new sources of supply could be found. Refer to the Social/Economic section for detailed discussions by alternative. To compensate for a lack of supply of timber, firms reach outside their normal market area for sources of supply. This, in turn, drains resources available to other firms, who then must reach outside their market areas. This effect would ripple through the market of the zone of influence as identified in the Social/Economic section of this chapter.

Refer to each resource section in this chapter for detailed disclosures of these irretrievable commitments of resources.

Irreversible Resource Commitments

Irreversible resource commitment applies primarily to the use of nonrenewable resources, such as minerals or Heritage resources, or those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

Two types of irreversible resource commitments would occur as a result of implementation of any of the action alternatives:

Energy Resources

Fossil fuels used in processing wood products which would result from an action alternative would be an irreversible loss.

Other Resources

There would be a limited irreversible loss in soil/rock resources used in road reconstruction/construction through use of existing and potential borrow pits.

No other irreversible resource commitments were determined as a result of the implementation of an action alternative. This would result due to the adherence to Forest Plan S&G and alternative mitigation for resources involved. Refer to detailed disclosures for each resource in Chapter Four of this document for supporting documentation of this conclusion.

4.6.13 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

All activities that occur as the result of the implementation of an alternative would cause some degree of environmental impact. The degree and severity of the adverse effects are minimized through the adherence to Forest Plan S&G's and alternative mitigation measures. Some impacts cannot be avoided if management activities occur regardless of the alternative implemented. These effects include:

a) Intermittent decrease in air quality due to dust from road maintenance and use; and smoke due to prescribed burning activities.
b) Short term and localized increases in soil erosion due to land disturbing activities.

c) Short term changes in the landscape from silviculture activities that may be disturbing to some Forest visitors.
d) Short term conflicts between recreation use and timber harvest, aspen maintenance and prescribed burning.
e) Temporary wildlife disturbance in some locations because of increased human activity.

For a complete disclosure of effects to each resource, refer to the detailed discussions for each resource found in Chapter Four.

4.6.14 PLANS AND POLICIES OF OTHER JURISDICTIONS

As evidenced from responses to scoping, and other public involvement solicitations, no conflicts have been identified between the objectives of other Federal, State, and local governments and Indian tribes, and the Proposed Action or Action Alternatives. Nor have any been identified relative to No Action.

4.6.15 MONITORING PLANS

Monitoring Plans, which would be part of the Proposed Action, or any action alternative to the Proposed Action, have been prepared. These plans include the item to be monitored, frequency of monitoring, person responsible, and projected costs. The monitoring plans are located in Appendix .

CHAPTER 5

CONSULTATION WITH OTHERS

Comments concerning the proposed project were requested from the following agencies, organizations, and individuals as part of the public involvement process. A more detailed description of the public involvement process is contained in the Project File.

5.1 AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONTACTED

5.1.1 AGENCIES:

Utah State Lands and Forestry
U.S. Senate Representatives
Farmers Home Administration
Bryce Canyon National Park
State Division of Energy
U.S Fish and Wildlife Service
Escalante State Park
Capitol Reef National Park
Division of Forestry Fire and State Lands
Department Conservation Division Environment Protection
U.S Bureau of Land Management
Utah Division of Wildlife Resources
Utah State Forester
U.S. Congress Representative
Utah State Representatives
Utah Division of Wildlife Resources
Department of Environmental Quality, Division - of Water Quality
Utah State Parks and Recreation
Office of Planning and Budget

5.1.2 ORGANIZATIONS:

Big Horn 4X4
Butler Forest Products
Columbia Helicopters
Golden Eagle 4 Wheel Drive
Maxwell Forest Watch
Telecor Incorporated
City of Kanab
Town of Antimony
The Spectrum
Cache Valley Hi Markers
Wasatch Ridge Riders
Green & Berry Law Offices
The Outdoor Source
Sierra Club Ogden Group
Sierra Club, Utah Valley Group
Anasazi State Park
The Richfield Reaper
Boulder Action Team
Boulder Mountain Wilderness Committee
Cache Ranger 4X4
Desert Tracker 4x4 INC
Lone Peak 4 Wheelers
Red Rock 4 Wheelers
Big R Manufacturing & Distributing
Garkane Power Association INC
Sugar Loafers
Bail Out
The City of Escalante
Skyline Snow Riders
Wizards
Garfield County Commission
USA Promotions
Duck Creek Snow Demonds
Thiokol Snow Drifters
Dinaland Snowmobile Club
N.W.F. Northern Rockies N.R.C

Lawrence Frandsen Lumber
Town of Orderville
Utah Trail Machine Assoc.
Sage Riders
Golden Spike M/C
Salt Lake Valley Snowmobile Club
The Wilderness Society
Utah Sports Riders Assoc.
The Town of Boulder
Public Land Use Consultation
Wasatch Trail Riders
Brian Head Cross Country Ski
Castle Country Drift Busters
Dolores D/E Eccles Broadcast Ctr.
Polaris
Catalyst Magazine
Paiute Indian Tribe
Golden Spike Snowmobile Assoc.
Stoltze Aspen Mill
Torgerson Timber INC
Utah ATV Association
Boss INC
The Salt Lake Tribune
Boulder Regional Group
Forest Guardian
Consulting Forester
Office of Special Council for Environmental Council
Sand Seekers
The Deseret News
Jensen Sawmill
Outdoor Sports
Utah Wilderness Coalition (Southwest Office)
Southern Utah Wilderness Alliance
Morton ASP Crash Dummies
Quad Fever
KSL Broadcast House
Utah Chapter of National Turkey Federation
Loa Sawmill
Natural Resources Research Library
Sanders Logging
The Snowflakes
Five Co. Association of Government
Utah Forest Products LLC
Wild Utah Forest Campaign
Southern Utah Timber Producers
Brian Head Snowmobile Club
Utah Wilderness Coalition (Utah Chapter)
Hells Backbone Ranch LLC.
Southwest Center for Biological Diversity
Utah Environmental Congress

5.1.3 INDIVIDUALS

Carl Albrecht
Phil Allen
Elaine Baldwin
Diane Bingham
Leon Bogedahl
Brad Brinkerhoff
Anita Carswell
Scott Chestnut
Terry Cooper
Cathy Dahms
Chris Dever
Kathy Erickson
Kevin Frandsen
Clem Griffin
Rex Griffiths
Harvey Halpern
Golda Haws
Gail Hoskisson
Hal & Athalia Jensen
Met Johnson
Wayne King
Clark & Florene Lamb
Louise Liston
Sherwood Albrecht
Charles Bagley Jr.
Steve Bennet
Eugene Blackburn
Cliff Bove
Thad Brown
Alton Chappel
Christopher Christie
Myron Cottam
Ross Denney
Lane Ellett & Sons
D O Foxley
Ricky Gleave
Quinn Griffin
Tanya Guest
Scott Hatfield
Klyn & Marlene Haws
Donnie Hunter
Alfred & Connie Jepsen
Paul Kanna
Jim Koons
Dal Liston
Marion Littlefield

Arthur & Julee Lyman	John & Miki Magyar
Thomas Messenger	Lynn Mitchell
Mark Nelson	Gavin Noyes
Virgel Nyburg	Robert Ott
Sherrell or Karen Ott	Devon & Vicki Owens
Mike Owens	Judith Pixley
Weldon Porter	Nad Rasmussen
Kevin Royle	John Savarese
Camille Shakespear	Franz & Margaret Shakespear
Doran Smith	Garren Smith
Gordon Smith	Wayne Smith
Jack Spence	Sam & Debbie Spencer
Cloyd Stratton	John & Diane Streman
Richard Teck	Jon Lee Torgerson
Henry Van Dyk	J Clair Veater
Wevern Walker	Dewey Woolsey
Jim Yardley	Walter Rudolph
Robert Cummings	Bill Cox
Alice Ernist	Bob & Sioux Cochran
H. Dell Lefevre	Max Lefevre
Mark Austin	Dave Kirkwood

5.1.4 MEETINGS

On February 4th, 1998 some members of the interdisciplinary team meet with the Boulder Town Council and interested citizen. This meeting was open to the public. No comments regarding extraordinary circumstances were expressed. The interdisciplinary team also met with Mark Austin, Liz Thomas, Mike Garrity, and Dave Mock on September 15th, 1998 to discuss the proposed action and received comments which led to development of alternatives.

5.2 COMMENTS RECEIVED

A total of 192 scoping notices were mailed. There were 22 written public responses and 2 telephone responses.

A description of the interdisciplinary process used to compile the scoping comments, identify the issues and develop alternatives to the proposed action is contained in Appendix 2.

5.3 LIST OF PREPARERS

5.3.1 INTERDISCIPLINARY TEAM MEMBERS

1) MARIANNE ORTON
ID Team Position: Team Leader/NFMA/NEPA Coordinator

Education:
1979 B.S. Range Science U.S.U

Experience:
1998 - Present Environmental Coordinator, Dixie National Forest.
1991 - 1998 Rangeland Specialist, Dixie National Forest, Escalante Ranger District.
1988 - 1991 Resource Officer, Tahoe National Forest, Sierraville Ranger District.
1986 - 1988 Range Conservation, Dixie National Forest, Powell Ranger District.
1983 - 1986 Range Conservation, Humbolt National Forest, Jarbridge Ranger District.
1980 - 1983 Range Conservation, Caribou National Forest, Montpelier Ranger District.

2) DAVID A. BARONDEAU
ID Team Position: Recreation/Trails

Education:
1972 Bachelor of Science, Forestry, University of Montana

Experience:
1989 - Present Timber Management Assistant, Escalante Ranger District, Dixie National Forest
1980 - 1989 Forester, Cedar City Ranger District, Dixie National Forest
1974 - 1980 Forester, Montana Division of Forestry, Missoula, Montana

3) DAVID M. KEEFE
ID Team Position: Silviculturist/Timber/Socio-Economics/Rangeland

Education:
1979 Bachelor of Science, Natural Resource Management, University of Connecticut

Experience:
1992 - Present Zone Silviculturist, Escalante and Teasdale Ranger Districts, Dixie National Forest

1988 - 1992 Timber Sale Preparation Forester, Escalante Ranger District, Dixie National Forest

1984 - 1988 Forestry Technician, Monticello Ranger District, MantiLaSal National Forest

1979 - 1984 Forestry Technician, Escalante Ranger District, Dixie National Forest

4) PETER GOETZINGER
ID Team Position: Fire/Fuels/Air Quality

Education:

1982 - 1984 Farm Operation and Management, Winona Area Technical Institute, Winona MN.

Experience:

1997 Present East Zone Assistant Fire Management Officer, Escalante Ranger District, Dixie National Forest.
1991 - 1997 District Fire Management Officer, Escalante Ranger District, Dixie National Forest.
1985 - 1991 Forestry Technician, Escalante Ranger District, Dixie National Forest.
1982 - 1985 Dairy Herdsman, Minnesota City, MN.
1982 Forestry Aide, Escalante Ranger District, Dixie National Forest.

5) DANIEL RANGE
ID Team Position: Hydrologist/Soils

Education:
1985 Bachelor of Science, Agricultural Engineering, University of Wisconsin at Madison

Experience:
1995 - Present East Zone Hydrologist, Dixie National Forest
1993 - 1995 Forest Hydrologist, National Forests in Texas
1991 - 1993 District Hydrologist, Shoal Creek Ranger District National Forests in Alabama
1990 - 1991 District Hydrologist, Clark's Fork Ranger District, Shoshone National Forest (Wyoming)
1986 - 1989 Irrigation Engineer/Watershed Management Engineer, US Peace Corps, Lesotho (Southern Africa)

6) KEN KESTNER
ID Team Position: Wildlife Biologist/Fisheries/TES/Special Uses

Education:
Bachelor of Science, Biology, 1973, Henderson State University
Graduate Studies, Biology, 1974-75 NE Louisiana State University,
1978 Henderson State University.

Experience:
1998 - Present District Wildlife Biologist / Special Uses Assistant, Escalante Ranger District, Dixie National Forest
1984 - 1997 District Wildlife Biologist, Rigdon Ranger District, Willamette National Forest
1982 - 1983 Interdisciplinary Wildlife Biologist/Range Conservationist/ Forester, Ojai Ranger District, Los Padres National Forest
1979 - 1981 District Wildlife Biologist, Ojai Ranger District, Los Padres National Forest
1976 - 1977 Museum Naturalist, National Museum of Natural History, Managua, Nicaragua, U.S. Peace Corps

7) RICHARD D. WHEELER
ID Team Position: Roadless/Visual Quality

Education:
1961 Bachelor of Science, Landscape Architecture, Texas A & M University

Experience:

1993 - Present	East Zone Landscape Architect, Escalante and Teasdale Ranger Districts, Dixie National Forest
1989 - 1993	Landscape Architect, Coronado National Forest
1987 - 1989	Owner, Wheeler Associates
1984 - 1987	Community Planner, Bureau of Indian Affairs
1974 - 1984	Owner/Designer/Contractor, Wheeler Associates
1972 - 1974	Outdoor Recreation Planner, Bureau of Land Management
1968 - 1972	Planner, Salt Lake County Planning Commission
1967 - 1968	Senior Landscape Architect, Utah Division of Parks and Recreation
1965 - 1967	Landscape Architect, Nezperce National Forest
1963 - 1965	Landscape Architect, Coronado National Forest
1961 - 1963	Landscape Architect, Apache National Forest

5.3.2 OTHER DNF EMPLOYEES WHO CONTRIBUTED TO THIS EIS

Jim Bayer	Forest Soil Scientist (retired)
Marian Jacklin	Forest Archaeologist
Frances Wilson	Resource Clerk
Kevin Schulkoski	Escalante District Ranger
Duane Stewart	Escalante Timber/Trails/Recreation

CHAPTER 6

LITERATURE CITATIONS

6.1 VEGETATION

Alder, Guy M. Age-Profiles of Aspen Forests in Utah and Northern Arizona. 1970.

Bradley, A.V., Noste, N.V., and Fischer, W.C. Fire Ecology of Forests and Woodlands in Utah. INT-287. 1992.

Brown, James K. Role and Use of Fire in Aspen. 1985

Bunting, Stephen C., Use of Prescribed Burning in Juniper and Pinyon-Juniper. 1986.

Chong, Geneva. Revegetation of Pinon-Juniper Woodlands With Native Grasses. 1994.

Clary, Warren P., and Tiedemann, Arthur R., Ecology and Values of Gambel Oak Woodlands. 1993.

Covington, W.W. Changes in Forest Conditions in Ponderosa Pine Ecosystems of Western North America. 1994.

Covington, W.W. and Sackett, S.S. Effects of Periodic Burning on Soil Nitrogen Concentration in Ponderosa Pine. 1986.

Covington, W.W. and Sackett, S.S. Fire Effects on Ponderosa Pine Soils and Their Management Implications. 1990.

Covington. W.W. and Moore, M.M. Southwestern Ponderosa Forest Structure. 1994.

Covington. W.W. and Moore, M.M. Post settlement Changes in Natural Fire Regimes and Forest Structure: Ecological Restoration of Old-Growth Ponderosa Pine Forests. 1995

Debyle, N.V. and R.P. Winokur. Aspen: Ecology and Management in the Western United States. 1985. RM 119. p 77-81.

DeByle, N.V., Bevins, C.D, and Fischer, W.C. Wildfire Occurrence in Aspen in the Interior Western

United States. 1987.

Draft Properly Functioning Condition, Process -- 12/31/96-- Draft.

Escalante Timber Harvest and Bark Beetle Control Program, 1981. U.S. Forest Service.

Ernst, Reg, and Pieper, Rex D., Changes in Pinon-Juniper Vegetation: A Brief History. 1996.

Forest Pest Management. An Evaluation of the Proposed Dwarf Mistletoe Control Project, Side Hollow Timber Sale, Escalante Ranger District, Dixie National Forest.

Forest Service. Changing Conditions in Southwestern Forests and Implications on Land Stewardship. 1993.

Frykman, J.L. Aspen Management in Utah.

Gottfried, Gerald J. Ecology and Management of the southwestern Pinyon-Juniper Woodlands. 1993

Gottfried, Gerald J., Swetnam, Thomas W., Allen, Craig D., Betancourt, Julio L., and Chung-MacCoubrey, Julio L. Chapter 6 Pinyon-Juniper Woodlands. 1996.

Hagle, S. and Schmitz, R. Managing Root Disease and Bark Beetles. 1994.

Hamilton, R. et al. Characteristics of Old-Growth Forests in the Intermountain Region. 1993.

Harniss, Roy O., and Harper, Kimball T. Tree Dynamics in Seral and Stable Aspen Stands of Central Utah. 1982.

Harper, Kimbal T., Wagstaff, Fred J., and Kunzler, Lynn M. Biology and Management of the Gambel Oak Vegetative Type: A Literature Review.

Hittenrauch, H.R. Aspen Management via Commercial Timber Sales. 1984.

Jacoby, W.R. Comparisons between Aspen Harvest Units With and Without Adequate Resprouting in the Rocky Mountain Region. 1990.

Jones, J.R. and DeByle, N.V. Fire. In RM119. 1985.

Knight, D.H. Parasites, Lightning, and the Vegetation Mosaic in Wilderness Landscapes. 1987.

Kolb, T.E., Wagner, M.R. and Covington, W.W. Concepts of Forest Health. 1994.

Long, James N. A Practical Approach to Density Management. 1985.

Lowry, Dennis G. An Old-Growth Forest Inventory Procedure for the Arapaho and Roosevelt National Forests, Colorado. 1992.

Madany, M.H. and West, N.E. Livestock Grazing - Fire Regime Interactions within Montane Forests of Zion National Park, Utah. 1983.

Mattson, W.J. and Haack, R.A. The Role of Drought in Outbreaks of Plant-eating Insects. 1987.

Muegler, W.F. Age Distribution and Reproduction of Intermountain Aspen Stands. 1989.

Muegler, W.F. and Campbell, R.B. Aspen Community Types of Utah. 1986.

O'Brien, Renee A. and Brown, Susan S. Forest Resources of the Dixie National Forest. 1998

Parmeter, J.R. Forest Stand Dynamics and Ecological Factors in Relation to Dwarf Mistletoe Spread, Impact, and Control. 1978.

Perala, D.A. Renewing Decadent Aspen Stands. 1991.

Properly Functioning Condition (PFC) Assessment for Major Vegetation Types on the Aquarius Plateau/Boulder Top and Barney Top/Table Cliffs Subsections.

Quarterly Economic Newsletter, Garfield County, Fourth Quarter, 1997.

Reynolds, R.T. et al. Management Recommendations for the Northern Goshawk in the Southwestern United States. 1992.

Sackett, Stephen, Haase, Sally, and Harrington, M.G. Restoration of Southwestern Ponderosa Pine Ecosystems With Fire. 1990

Schier, George A. Deterioration of Aspen Clones in the Middle Rocky Mountains. 1970

Stein, S.J. Fire History of the Paunsagaunt Plateau in Southern Utah. 1988.

Stevens, R.E., McCambridge, W.F. and Edminster, C.E. Risk Rating Guide for Mountain Pine Beetle in Black Hills Ponderosa Pine. 1980.

Tausch, Robin J., and West, Neil, E. Plant Species Composition Patterns with Differences in Tree Dominance on a Southwestern Utah Pinon-Juniper Site. 1995.

USDA Forest Service, Fs-630, October, 1998 Charting Our Future... A Nation's Natural Resource Legacy

Van Pelt, Nicholas S. and Johnson, David W. Isolated Butte and Mesa Summits of the Colorado Plateau. 1993.

Wilson, J.L. and Tkacz, B.M. Pinyon Ips Outbreak in Pinyon Juniper Woodlands in Northern Arizona: A Case Study. 1993.

Wilson, J.L. and Tkacz, B.M. Status of Insects and Diseases in the Southwest: Implications for Forest Health. Undated.

Youngblood, A. and Mauk, R. Coniferous Forest Habitat Types of Central and Southern Utah. 1985.

6.2 ROADLESS/UNDEVELOPED RESOURCES

The Wilderness Act (P.L. 88-577) of 1964

USDA Forest Service. 1986. Land and Resource Management Plan for the Dixie National Forest. Cedar City, UT.

USDA Forest Service. 1986. 1986 ROS Book

DRAFT Intermountain Region Planning Desk Guide Roadless Area Inventory and Evaluation. 5/20/98.

6.3 VISUAL QUALITY

USDA Forest Service. 1974. National Forest Landscape Management, Volume 2, Chapter 1; The Visual Management System. Agriculture Handbook 462. Washington D.C. April, 1974

6.4 SOILS/WATERSHED

Bayer, James T., Effects of Timber Harvest on Soil Dixie NF, 1996.

Bayer, James T., Effects of Fire on Soil Resource, 1997.

Bosch, J. M., and Hewett, J. D. 1982. A review of Catchment Experiments to Determine The Effect of Vegetative Changes on Water Yield and Evapotranspiration. Journal of Hydrology, 55 (1982) 3-23. Elsevier Scientific Publishing Company 1982.

Brinkley, Dan, and Brown, Thomas C. 1993. Forest Practices as Nonpoint Sources of Pollution in North America. Water Resources Bulletin, American Water Resources Association. Vol. 29, No. 5. pgs. 729-740.

Dixie National Forest Level II Riparian Inventory, East Fork Boulder Creek, Prepared by EnviroData Systems, Inc., 1994

Dixie National Forest Level II Riparian Inventory, Boulder Creek, Prepared by EnviroData Systems, Inc., 1994

Dixie National Forest, 1994, East Zone Water Quality Monitoring, Water Year 1994.

Dixie National Forest, 1995, East Zone Water Quality Monitoring, Water Year 1995.

Dixie National Forest, 1996, East Zone Water Quality Monitoring, Water Year 1996.

Dixie National Forest, 1997, East Zone Water Quality Monitoring, Water Year 1997. 1996 Macroinverterbrate Analysis Section, pg 7-26.

Dixie National Forest, 1997, East Zone Water Quality Monitoring, Water Year 1997.

Dixie National Forest, 1998, Watershed Monitoring Results.

Dunne, Thomas, and Leopold, Luna B. 1978. Water in Environmental Planning, p. 150-152.
EPA, 1993 Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Costal Waters EPA-840-B-93-001c, January 1993.

Elliot W., and Robichaud, P., Risk Analysis After Fire With WEPP, USDA Forest Service, Rocky Mountain Research Station. Burned Area Rehabilitation Course March 31, 1998.

Flint, Richard F., and Denny, Charles S., Quarternary Geology of Boulder Mountain Aquarius Plateau, Utah, 1958

Forest Service Handbook, FSH 2509.18; R4 supplement 2509.18-95-1, pg 5-7.

Gifford, Gerald F.. 1983. A Preliminary Quantification of the Impacts of Aspen to Conifer Succession on Water Yield within the Colorado River Basin. Utah Water Research Laboratory. January 1983.

Johnston, Robert S. 1984. Effect of Small Aspen Clearcut on Water Yield and Water Quality. January 1997.

Kaufman, M. R., Troendle, Charles A., Ryan, Michael G., and Mowrer, H. Todd. Trees-The Link Between Silviculture and Hydrology, p. 56, 1987.

Kendall, Craig N. 1997. Effects of Fire on Watershed Hydrology and Water Quality. January 1997.

Kendall, Craig N. 1999. Effects of Timber Harvest and Road Construction on watershed Hydrology and Water Quality, April 1999,

LBS Environmental Analysis, 1995

LBS Project Environmental Analysis, 1995

Sand Creek Soil Stabilization Project Environmental Analysis, 1995

Sheppard, W. D., Troendle, C.E., and Edminster, C. B. 1991. Linking Water and Growth and Yield Models to Evaluate management Alternatives in Subalpine Ecosystems. p.47.

State of Utah, 1994, Standards of Water Quality for Waters of the State (R317-2, Utah Administrative Code), Utah Department of Environmental Quality Division of Water Quality, February 16, 1994.

(SWCP XX.XX), (e.g. SWCP 15.01) refers SWCP number 15.01 in Forest Service Handbook (FSH) 2509.22, Soil and Water conservation Practices Handbook.

Tew, Ronald K., Estimating Soil Erosion Losses From Utah Watersheds, 1973.

Troendle, C.A. 1982. The effects of small clearcuts on Water Yield from the Deadhorse Watershed. Fraser, CO. p. 75-83. In: Proceedings of the 50th Annual Meeting of the Western Snow Conference (Reno, NV April 19-23, 1982) 225p. Colorado State University, Fort Collins, CO. p. 80.

USDA Forest Service. 1981. Guide For Predicting Sediment Yields from Forested Watershed. Northern and Intermountain Regions. October 1981.

USDA Forest Service. 1993. Memorandum Of Understanding Between The Forest Service and Division of Water Quality, Utah Department of Environmental Quality, and the Utah Department of Agriculture.

USDA Forest Service. 1993. Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities. February 1993.

Utah Water Quality Assessment Report to Congress 1996, Utah Department of Environmental Quality Division of Water Quality, August, 1996.

6.5 FISHERIES/WILDLIFE

Barbour, R.W. and W.H. Davis. 1969. Bats of America. The University Press of Kentucky.

Bock, C.E. and J.H. Bock. 1974. On the Geographical Ecology and Evolution of the Three-toed Woodpecker, *Picoides tridactylus* and *P. arcticus*. The American Midland Naturalist. 92 (2). 1974.

Bunting, S.C. 1994. Effects of fire on juniper woodland ecosystems in the Great Basin. Gen. Tech. Rep. INT-GTR-313. Ogden, UT. Department of Agriculture, Forest Service, Intermountain Research Station: 53-55.

Crampton, L.H. and R.M.R. Barclay. 1998. Selection of Roosting and Foraging Habitat by Bats in Different-Aged Aspen Mixedwood Stands. Conservation Biology 12 (6): 1347-1358.

DeByle, N.V. 1975. Wildlife. *in* Aspen:Ecology and Management in the Western United States. USDA-Forest Service. General Technical Report RM-119.

Dixie National Forest. 1998. Life History of Endangered, Threatened, and Sensitive Species of Dixie National Forest, revised March 1998.

Dobler, F.C. 1994. Washington State shrub-steppe ecosystem studies with emphasis on the relationship between nongame birds and shrub and grass cover densities. Gen. Tech. Rep. INT-GTR-313. Ogden, UT. Department of Agriculture, Forest Service, Intermountain Research Station: 149-161.

Goodrich, S. and D. Rooks. 1999. Control of Weeds at a Pinyon-Juniper Site by Seeding Grass. *in* Proceedings: Ecology and Management of Pinyon-Juniper Communities Within the Interior West. USDA-Forest Service. Proceedings RMRS-P-9. June, 1999.

Graham, R.T., et al. 1999. The Northern Goshawk in Utah: Habitat Assessment and Management Recommendations. USDA-Forest Service. General Technical Report RMRS-GTR-22. Feb. 1999.

Hunter, M.L., Jr. 1990. Wildlife, Forests, and Forestry. Prentice Hall, Englewood Cliffs, N.J. pp.31. USDA, 1997. An Assessment of Forest Ecosystem Health in the Southwest. Gen. Tech. Report RM-GTR-295. Fort Collins, CO. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 29.

Kuenzi, A.J, G.T.Downnard, M.L. Morrison. 1999. Bat Distribution and Hibernacila Use in West Central Nevada. Great Basin Naturalist 59 (3), 1999.

Leonard, M.L. and M.B. Fenton. 1983. Habitat Use by Spotted Bats (*Euderma maculatum*, Chiroptera: Vespertilionidae): Roosting and Foraging Behavior. Can. J. Zool., Vol.61. 1983.

MacMahon, J.A. 1997. Deserts: National Audubon Society Nature Guides. Alfred A. Knopf, New York.

Naillon, D., K.Memmott, S.B.Monsen. 1999. A comparison of Understory Species at Three Densities in a Pinyon-Juniper Woodland. *in* Proceedings: Ecology and Management of Pinyon-Juniper Communities Within the Interior West. USDA Forest Service, Proceedings RMRS-P-9.

Reynolds, R.T. and B.D.Linkhart. 1992. Flammulated Owls in Ponderosa Pine: Evidence of Preference for Old Growth. *in* Old-Growth Forests in the Southwest and Rocky Mountains Regions, Proceedings of a Workshop. USDA Forest Service, General Technical Report RM-213.

Stevens, R. 1999. Restoration of Native Communities by Chaining and Seeding. *in* Proceedings: Ecology and Management of Pinyon-Juniper Communities Within the Interior West. USDA-Forest Service. Proceedings RMRS-P-9. June, 1999.

Thomas, J.W. et al. 1979. Wildlife Habitats in Managed Forests, USDA Forest Service Agriculture Handbook No. 553, pg 109.

Thomas, D.W. 1988. The Distribution of Bats in Different Ages of Douglas-fir Forests. J. Wildlife Manage. 52 (4): 1988.

USDA-Forest Service. 1999. Utah Northern Goshawk Project Environmental Assessment. USDA-Forest Service, Intermountain Region. October, 1999.

Wakeling, B.F. and T.D. Rogers. 1994. Characteristics of Pinon-Juniper Habitats Selected for Feeding by Wintering Merrian's Turkey. *in* Desired Future Conditions for Pinon-Juniper Ecosystems. USDA-Forest Service. General Technical Report RM-258. August, 1994.

Willis, M.J. and R.F. Miller. 1999. Importance of Western Juniper Communities to Small Mammals. *in* Proceedings: Ecology and Management of Pinyon-Juniper Communities Within the Interior West. USDA-Forest Service. Proceedings RMRS-P-9. June, 1999.

USDA-Forest Service. 1991. Threatened, Endangered, and Sensitive Species of the Intermountain Region. Ogden, UT.

Woodsworth, G.C., G.P. Bell, and M.B. Fenton. 1981. Observations of the Echolation, Feeding Behavior, and Habitat Use of *Euderma maculatum* (Chiroptera: Vespertilionidae) in Southcentral British Columbia. Can. J. Zool. Vol. 59. 1981.

6.6 FIRE/AIR QUALITY

Alvey, Edson B., They Called it Potato Valley, no date, pg. 40

Amundson and others 12/31/96, Draft Properly Functioning Condition, Process, entire document.

Arno, Stephen F., Harrington, Michael G., Use Thinning and Fire to Improve Forest Health and Wildlife Habitat, Tree Farmer May/June 1995, entire report.

Bradley, Anne F., Noste, Nonan V., Fischer, William C., Fire Ecology of Forest and Woodlands in Utah.

California Department of Forestry and Fire Protection, pcFirdat (v3.92)/ pcSEASON (v2.60), Fire Family for personal computers, software and user guide, Stephens, T. and Blanchard, H., 9/95.

Dixie National Forest, Land and Resource Management Plan, 1986, Pages IV-32, IV-54, IV-55, IV-66.

Ferry, Gardner and others 1985, National Wildfire Coordinating Group, Prescribed Fire and Fire Effects Working Team, Prescribed Fire Smoke Management Guide 420-2.

Goetzinger, Peter M., Dixie National Forest, A Fire Management Strategy for the East Side Fire Management Zone, 4/98.

National Wildfire Coordinating Group, S-390 Fire Behavior Field Guide, NFES 1981, 1981, Page 43.

Reynolds, R.T., Graham R.T., Reiser, M. H., Bassett, R. L., Kennedy P. L., Boyce, D. A., Goodwin, G., Smoth, R., Fisher, L. E.. 1992 Management Recommendations for the Northern Goshawk in the Southwestern United States. General Technical Report RM-217 Fort Collins, Colorado: USDA Forest Service Rocky Experiment Station.

Sestak, M. L., A. R. Reibau, Simple Approach Smoke Estimation Model (SASEM). USDI Bureau of Land Management.

Shaver, Christine and others 1988, Air Quality in the National Park in Cooperation with Energy and Resource Consultants, Inc. Natural Resource Report 88-1, National Park Service, Pages 2-10, 2-11, 2-14, and 2-15.

State of Utah, Department of Environmental Quality, Division of Air Quality, 1993, Utah Air Emission Inventory, Pages 2-3, and 6.

United States Environmental Protection Agency, EPA Document 454/R-97-013, National Air Quality and Emissions Trends Report, 1996, chapter 3, and pages 110-111 of the appendix A.

USDA Forest Service, Southwest Region, Photo Series for Quantifying Forest Residue in the Southwestern Region, entire book.

USDA Forest Service, Intermountain Forests and Range Experiment Station, Photo Guide for Appraising Downed Woody Fuels in Montana Forests, General Technical Report INT-97, 1981, Fischer, William, C., entire Document.

USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden Utah, 1982, Aids to Determining Fuel Models for Estimating Fire Behavior, General Technical Report INT-122, Anderson, Hal c., entire report.

USDA Forest Service, The Fire Behavior Research Work Unit Intermountain Fire Science Laboratory Missoula, Montana, the BEHAVE SYSTEM, BURN SUBSYSTEM, FIRE1, PROGRAM, version 4.4, software, Andrews, P. et. Al, 1997.

USDA Forest Service, Intermountain Research Station, 1991, Predicting Behavior and Size of Crown Fires in the Northern Rocky Mountains, Research Paper INT-438, Rothermel, Richard c., page 2.

USDA Forest Service, DOI, Federal Wildland Fire Management Policy & Program Review, Final Report, 12/18/95.

Utah Smoke Management Plan, Final, 7/20/99, entire document.

Wiitala, Marc R., PROBACRE version 1.1, USDA Forest Service, Portland.

6.7 RECREATION/TRANSPORTATION/WILDERNESS

Bowker, J.M., English, Donald B.K., and Cordell ,H. Ken. Projections of Outdoor Recreation Participation to 2050. Outdoor Recreation in American Life: A Natural Assessment of Demand and Supply Trends. Champaign, Illinois, Sagamore Publication, 1999.

Dixie National Forest, Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, August, 1978.

Escalante Interagency Office, Office Visitor Count, January, 1999.

Escalante Interagency Office, Office Visitor Count, November, 1999.

Frissell, Sidney S. Judging Recreation Impacts on Wilderness Campsites, Journal of Forestry, August, 1978.

The Utah Wilderness Act

USDA Forest Service, Decision Notice and Finding of No Significant Impact for the Sand Creek Soil Stabilization Project, Dixie National Forest, Cedar City, Utah, August 29, 1995.

USDA Forest Service. The Forest Service Program for Forest and Rangeland Resources, A Long Term Strategic Plan, Washington, D.C. May, 1990.

USDA Forest Service, Report of the Forest Service: Fiscal Yeay 1998. Washington, D.C. May, 1999.

USDA Forest Service, Travel Map, Dixie National Forest, Cedar City, Utah. 1998.

USDA Forest Service. Land and Resource Management Plan for the Dixie National Forest, Cedar City, Utah, 1986.

CHAPTER 7

GLOSSARY

affected environment - The natural environment that exists at the present time in an area being analyzed.

age class - An age grouping of trees according to an interval of years, usually 20 years. A single age class would have trees that are within 20 years of the same age, such as 1-20 years or 21-40 years.

airshed - A geographic area that shares the same air.

allotment (range allotment) - The area designated for use by a prescribed number of livestock for a prescribed period of time. Though an entire Ranger District may be divided into allotments, all land will not be grazed, because other uses, such as recreation or tree plantings, may be more important at a given time.

anadromous fish - Species of fish that mature in the sea and migrate into streams to spawn.

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives. This term is a new term that does not replace any previous used terms.

Appropriate Suppression Response - Initial action on wildfires will be fast, energetic, thorough, and conducted with high regard for personnel safety. The appropriate suppression response will be one, or a combination of; 1) Confinement, 2) Containment, or 3) Control, considering the above mentioned criteria, and in accordance with approved Fire Management Plans. Also see appropriate management response.

aquatic macroinvertebrates - Invertebrates living within aquatic systems that are large enough to be seen with the naked eye (e.g. most aquatic insects).

aquifer - A body of rock that is saturated with water or transmits water.

Area Source - A source category of air pollution that generally extended over a large area. Prescribed burning, field burning, home heating, and open burning are examples of area sources.

aspect - The direction a slope or watershed faces. A hillside facing east has an eastern aspect.

ASQ (allowable sale quantity) - The amount of timber that may be sold within a certain time period from an area of suitable land. The suitability of the land and the time period are specified in the Forest Plan.

AUM (animal unit month)- The quantity of forage required by one mature cow and her calf (or the equivalent, in sheep or horses, for instance) for one month.

background - The landscape as seen from a distance. The landscape area located from 4 miles to infinity from the viewer.

bark beetle - An insect that bores through the bark of forest trees to eat the inner bark and lay its eggs. Bark beetles are important killers of forest trees.

basal area - The area of the cross section of a tree trunk near its base, usually 4 and 1/2 feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

big game - Large mammals, such as deer, elk, bear, and antelope that are hunted for sport.

biological diversity - The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.

biota - The plant and animal life of a particular region.

BMP (Best Management Practices)- Practices designed to prevent or reduce water pollution. Also, referred to as Soil and Water Conservation Practices (SWCPs).

board foot - A measurement term for lumber or timber. It is the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

broadcast burn - A prescribed fire that burns a designated area. These controlled fires can reduce wildfire hazards, improve forage for wildlife and livestock, or encourage successful regeneration of trees.

browse - Twigs, leaves, and young shoots of trees and shrubs that animals eat. Browse is often used to refer to the shrubs eaten by big game, such as elk and deer.

buffer - A land area that is designated to block or absorb unwanted impacts to the area beyond the buffer. Buffer strips along a trail could block views that may be undesirable. Buffers may be set aside next to wildlife habitat to reduce abrupt change to the habitat.

canopy - The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be use to describe lower layers in a multi-storied forest.

canopy cover - see cover class.

capture (input) - one of the ways functions are described; resources (organisms, materials, and energy) brought into the system (i.e. photosynthesis, migration onto summer range, pollution brought in by wind or water).

cavity - A hole in a tree often used by wildlife species, usually birds, for nesting, roosting, and reproduction.

clear cut - A harvest in which all or almost all of the trees are removed in one cutting.

climax - The culminating stage in plant succession for a given site. Climax vegetation is stable, self-maintaining, and self-reproducing.

collector roads - These roads serve small land areas and are usually connected to a Forest System Road, a county road, or a state highway.

common (Class B) landscape - Areas where features contain variety in form, line, color, and texture or combinations thereof, but which tend to be common throughout the character type and are not outstanding in visual quality.

composition - What an ecosystem is composed of. Composition could include water, minerals, trees, snags, wildlife, soil, microorganisms, and certain plant species.

conifer - A tree that produces cones, such as a pine, spruce, or fir tree.

connectivity - The linkage of similar but separated vegetation stands by patches, corridors, or "stepping stones" of like vegetation. This term can also refer to the degree to which similar vegetation are linked.

contour - A line drawn on a map connecting points of the same elevation.

corridor - Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and hardwoods between meadows where wildlife feed.

cover - Any feature that protects or conceals wildlife or fish from view or elements. Cover may be dead or live vegetation, boulders, or undercut streambanks. Animals use cover to escape from predators, reproduce, rest, or feed.

cover class - Represents a percentage range for a fixed area covered by the crowns of plants. It is measured as a vertical projection of the outermost portion of the foliage. Cover class A = <40% canopy cover; cover class B = 40-60% canopy cover; cover class C = >60% canopy cover.

cover type (forest cover type) - Stands of a particular vegetation type that are composed of similar species. The aspen cover type contains plants distinct from the pinyon-juniper cover type.

created opening - An opening in the forest cover created by the application of even-aged silvicultural practices.

critical habitat - Areas designated by the U.S. Fish and Wildlife Service for the survival and recovery of Federally listed threatened or endangered species.

crown closure - see cover class.

crown height - The distance from the ground to the base of the crown of a tree.

cultural resource - The remains of sites, structures, or objects used by people in the past; this can be historical or pre-historic.

cumulative effects - Effects on the environment that result from separate, individual actions that, collectively, become significant over time.

cycling - One of the ways functions are described; resources which are transported within the system (i.e. animal migration, nutrient cycling in a forest stand, snow melt becoming part of the surface or groundwater flow).

dbh (diameter at breast height) - The diameter of a tree 4 and 1/2 feet above the ground on the uphill side of the tree.

decision criteria - The rules and standards used to evaluate alternatives to a proposed action on National Forest land. Decision criteria are designed to help a decision maker identify a preferred choice from the array of alternatives.

DEIS (Draft Environmental Impact Statement)- The draft version of the Environmental Impact Statement that is released to the public and other agencies for review and comment

desired future condition - Land or resource conditions that are expected to result if goals and objectives are fully achieved.

developed recreation - Recreation that requires facilities that, in turn, result in concentrated use of the area. For example, skiing requires ski lifts, parking lots, buildings, and roads. Campgrounds require roads, picnic tables, and toilet facilities.

dispersed recreation - Recreation that does not occur in a developed recreation site, such as hunting, backpacking, and scenic driving.

distinctive (Class A) landscape - Areas where features of landform, vegetative patterns, water forms, and rock formations are of unusual or outstanding visual quality.

disturbance - Any event, such as forest fire or insect infestations that alter the structure, composition, or functions of an ecosystem. Disturbance can also mean disruption to an animal's behavior or well being.

ecology - The interrelationships of living things to one another and to their environment, or the study of these interrelationships.

ecosystem - An arrangement of living and non-living things and the forces that move among them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within ecosystems.

ecosystem management - An ecological approach to natural resource management to assure productive, healthy ecosystems by blending social, economic, physical, and biological needs and values.

ecotype - A population of a species in a given ecosystem that is adapted to a particular set of environmental conditions.

edge - The margin where two or more vegetation patches meet, such as a meadow opening next to a mature forest stand, or a ponderosa pine stand next to an aspen stand.

edge effect - the increased richness of plants and animals resulting from the mixing of two communities where they join.

element (of ecosystems) - An identifiable component, process, or condition of an ecosystem.

endangered species - A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

endemic plant/organism - A plant or animal that occurs naturally in a certain region and whose distribution is relatively limited geographically.

environmental analysis - An analysis of alternative actions and their predictable long and short-term environmental effects. Environmental analyses include physical, biological, social, and economic factors.

environmental assessment - A brief version of an Environmental Impact Statement. (See Environmental Impact Statement.)

Environmental Impact Statement - A statement of environmental effects of a proposed action and alternatives to it. The EIS is released to other agencies and the public for comment and review.

ephemeral streams - Streams that flow only as the direct result of rainfall or snowmelt. They have no permanent flow.

erosion - The wearing away of the land surface by wind or water.

even aged management - Timber management actions that result in the creation of stands of trees in which the trees are essentially the same age.

existing scenic integrity - Current state of the landscape, considering previous human alterations.

eyrie - A ledge along a cliff used for nesting by raptors.

fauna - The animal life of a given area.

felling - Cutting down trees.

fire regime - The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

fisheries habitat - Streams, lakes, and reservoirs that support fish, or have the potential to support fish.

flood plain - A lowland adjoining a watercourse. At a minimum, the area is subject to a 1% or greater chance of flooding in a given year.

flora - The plant life of a given area.

forage - All browse and non-woody plants that are eaten by wildlife and livestock.

forb - A broadleaf plant that has little or no woody material in it.

foreground - Detailed landscape generally found from the observer to 1/2 mile away. See also immediate foreground.

forest cover type - See cover type.

forest health - A measure of the robustness of forest ecosystems. Aspects of forest health include biological diversity; soil, air, and water productivity; natural disturbances; and the capacity of the forest to provide a sustaining flow of goods and services for people.

Forest Roads and Trails - Roads and trails under the jurisdiction of the Forest Service.

Forest Supervisor - The official responsible for administering National Forest lands on an administrative unit, usually one or more National Forests. The Forest Supervisor reports to the Regional Forester.

Forest Vegetation Simulation - A computer model for timber growth and yield. It projects per acre growth and volume yield for commercial timber stands. Formerly known as "Prognosis".

fragmentation - The splitting or isolating of patches of similar habitat, typically forest cover, but including other types of habitat. Habitat can be fragmented naturally or from forest management activities, such as clearcut logging.

fuels - Plants and woody vegetation, both living and dead, that are capable of burning.

fuels management - The treatment of fuels that would otherwise interfere with effective fire management or control. For instance, prescribed fire can reduce the amount of fuels that accumulate on the forest floor before the fuels become so heavy that a natural wildfire in the area would be explosive and impossible to control.

fuelwood - Wood cut into short lengths for burning.

function - All the processes within an ecosystem through which the elements interact, such as succession, the food chain, fire, weather, and the hydrologic cycle.

game species - Any species of wildlife or fish that is hunted or harvested according to prescribed limits and seasons.

geomorphic processes - Processes that change the character and form of the earth's surface such as volcanic activity, running water, and glacial action.

GIS (geographic information systems)- GIS is both a database designed to handle geographic data as well as a set of computer operations that can be used to analyze the data. In a sense, GIS can be thought of as a higher order map.

ground fire - A fire that burns along the forest floor and does nor affect trees with thick bark or high crowns.

habitat - The area where a plant or animal lives and grows under natural conditions.

habitat type - A way to classify land area . A habitat type can support certain climax vegetation, both tree and undergrowth species. Habitat typing can indicate the biological potential of a site.

hiding cover - Vegetation capable of hiding 90% of an adult elk or deer from human's view at a distance of 200 feet or less.

hydrology - The science of water distribution and movement in the earth, on the surface, and in the atmosphere.

igneous rock - Rocks formed when high temperature, molten mineral matter cooled and solidified.

immediate foreground - The detailed feature landscape found within the first few hundred feet of the observer, generally, from the observer to 300 feet away.

indicator species - A plant or animal species related to a particular kind of environment. Its presence indicates that specific habitat conditions are also present. (See also MIS.)

integrated pest management - IPM evaluates alternatives for managing forest pest populations, based on consideration of pest-host relationships.

interdisciplinary team - A team of individuals with skills from different disciplines that focuses on the same task or project.

intermittent stream - a stream that only flows during wet periods of the year (spring and early summer).

Intermountain Region - The portion of the USDA Forest Service, also referred to as Region Four, that includes National Forests in Utah, Nevada, southern Idaho, and southwestern Wyoming.

irretrievable - One of the categories of impacts mentioned in the National Environmental Policy Act to be included in statements of environmental impacts. An irretrievable effect applies to losses of production or commitment of renewable natural resources. For example, while an area is used as a ski area, some or all of the timber production there is irretrievably lost. If the ski area closes, timber production could resume; the loss of timber production during the time that the area was devoted to winter sports is irretrievable. However, the loss of timber production during that time is not irreversible, because it is possible for timber production to resume if the area is no longer used as a ski area.

irreversible - A category of impacts mentioned in statements of environmental impacts that applies to non-renewable resources, such as minerals and archaeological sites. Irreversible effects can also refer to effects of actions that can be renewed only after a very long period of time, such as the loss of soil productivity.

ladder fuels - Vegetation located below the crown level of forest trees which can carry fire from the forest floor to tree crowns. Ladder fuels may be low-growing tree branches, shrubs, or smaller trees.

landing - Any place where cut timber is assembled for further transport from the timber sale area.

landscape - A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts. Landscapes are often used for coarse grain analysis.

landscape character - Particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique.

litter (forest litter) - The freshly fallen or only slightly decomposed plant material on the forest floor. This layer includes foliage, bark fragments, twigs, flowers, and fruit.

logging residue (slash) - The residue left on the ground after timber cutting. It includes unused logs, uprooted stumps, broken branches, bark, and leaves. Certain amounts of slash provide important ecosystem roles, such as soil protection, nutrient cycling, and wildlife habitat.

long-term - Unless otherwise defined, long-term refers to longer than 10 years.

M - Thousand. Five thousand board feet of timber can be expressed as 5M board feet.

mass movement/wasting - The down-slope movement of large masses of earth material by the force of gravity. Also called a landslide.

MBF - Thousand Board Feet (See board feet.)

microclimate - The climate of a small site. It may differ from the climate at large of the area due to aspect, tree cover (or the absence of tree cover), or exposure to winds.

middleground - The zone between the foreground and the background while viewing the landscape. The area located from 1/2 mile to 4 miles from the observer.

mineral soil - Soil that consists mainly of inorganic material, such as weathered rock, rather than organic matter.

MIS (management indicator species)- A wildlife species whose population will indicate the health of the ecosystem in which it lives and, consequently, the effects of forest management activities to that ecosystem. MIS species are selected by land management agencies. (See "indicator species".)

mitigation - Actions taken to avoid, minimize, or rectify the impact of a land management practice.

mixed stand - A stand consisting of two or more tree species.

MMBF - Million Board Feet (See board feet.)

modification - A visual quality objective; management activities may visually dominate the original characteristic landscape, but they must borrow from naturally established form, line, color, or texture so that the activity blends with the surrounding area.

monitoring and evaluation - The periodic evaluation of forest management activities to determine how well objectives were met and how management practices should be adjusted. See "adaptive management".

mortality - Trees that were merchantable and have died within a specified period of time. The term mortality can also refer to the rate of death of a species in a given population or community.

mosaic - Areas with a variety of plant communities over a landscape, such as areas with trees and areas without trees occurring over a landscape.

natural barrier - A natural feature, such as a lava flow, river or mountain range, that will restrict animal travel or spread of a plant population.

natural disturbance - See disturbance.

natural landscape character - Landscape character that originated from natural disturbances, such as wildfires, glaciation, succession of plants from pioneer to climax species, or indirect activities of humans, such as inadvertent plant succession through fire prevention.

natural appearing landscape character - Landscape character that has resulted from human activities, yet appear natural, such as historic conversion of native forests into farmlands, pastures, and hedgerows that have revered back to forests through reforestation activities or natural regeneration.

natural range of variability - See range of variability

natural resource- A feature of the natural environment that is of value in serving human needs.

NEPA (National Environmental Policy Act) - Congress passed NEPA in 1969 to encourage productive and enjoyable harmony between people and their environment. One of the major tenets of NEPA is its emphasis on public disclosure of possible environmental effects of any major action on public lands. Section 102 of NEPA requires a statement of possible environmental effects to be released to the public and other agencies for review and comment.

NFLRMP (National Forest Land and Resource Management Plan) - Also called the Forest Plan or just the Plan, this document guides the management of a particular National Forest and establishes management standards and guidelines for all lands of that National Forest.

NFMA (National Forest Management Act) - This law was passed in 1976 and requires the preparation of Regional Guides and Forest Plans.

No Action alternative- The most likely condition expected to exist in the future if management practices continue unchanged.

nongame - Wildlife species that are not hunted with prescribed seasons for sport.

nonpoint source pollution - Pollution whose source is not specific in location. The sources of the discharge are dispersed, not well defined, or constant. Rain storms and snowmelt often make this type of pollution worse. Examples include sediments from logging activities and runoff from agricultural chemicals.

non renewable resource - A resource whose total quantity does not increase measurably over time, so that each use of the resource diminishes the supply.

notice of intent - A notice in the federal register of intent to prepare an environmental impact statement on a proposed action.

old growth - Old forests often containing several canopy layers, variety in tree sizes and species, decadent old trees, and standing and dead woody material.

opening - An opening in the forest created by even-aged silvicultural practices.

ORV - Off-road vehicles, such as motor cycles, 4-wheel drive vehicles, and 4-wheelers. May also be called OHV (off-highway vehicle).

output - one of the ways functions are described; resources which leave a system (i.e. animals migrating out of an area, mass erosion, removal of commercial timber from an area).

overstory - The upper canopy layer; the plants below comprise the understory.

parent material - The mineral or organic matter from which the upper layers of soil are formed.

park-like structure - Stands with large scattered trees and open growing conditions, usually maintained by ground fires.

partial retention - A visual quality objective which, in general, means human activities may be evident, but must remain subordinate to the characteristic landscape.

Particulate Matter - Ant liquid or solid particles. "Total Suspended Particulates" as used in air quality are those particles suspended in or falling through the atmosphere. They Generally range in size from 0.1 to 100 microns.

patch - An area of homogeneous vegetation, in structure and composition.

patch cut - A clearcut that creates small openings in a stand of trees, usually between 15 and 40 acres in size. On the Dixie National Forest and elsewhere, patch cuts are used to provide the disturbance needed to regenerate aspen.

percolation - Downward flow or infiltration of water through the pores or spaces of rock or soil.

perennial stream - A stream that flows throughout the year.

permitted grazing - Grazing on a National Forest range allotment under the terms of a grazing permit.

personal use - The use of a forest product, such as firewood, for home use and not for commercial use.

persons-at-one-time (PAOT) - A recreation capacity measurement term indicating the number of people who can use a facility or area at one time.

planning area - The area of National Forest land covered by a Regional Guide or Forest Plan.

planning period - The 50 year time frame for which goods, services, and effects were projected in the development of the Forest Plan.

PM 10 - Particles with an aerodynamic diameter smaller than than or equel to a nominal ten micrometters.

pole/sapling - The stage of forest succession in which trees are between 3 and 7 inches in diameter and are the dominant vegetation.

pole timber - Trees at least 5 inches in diameter, but smaller than the minimum size for sawtimber.

PNV - See present net value.

precommercial thinning - Removing some of the trees from a stand that are too small to be sold for lumber or house logs, so the remaining trees will grow faster.

predator - An animal that lives by preying on other animals. Predators are at or near the tops of food chains.

prescribed fire - Fire set intentionally in wildland fuels under prescribed conditions and circumstances. Prescribed fire can rejuvenate forage for livestock and wildlife or prepare sites for natural regeneration of trees.

prescription - Management practices selected to accomplish specific land and resource management objectives.

present net value (PNV), also called present net worth - The measure of the economic value of a project when costs and revenues occur in different time periods. Future revenues and costs are "discounted " to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable than dollars in the future. PNV is used to compare project alternatives that have different cost and revenue flows.

Prevention of Significant Deterioration (PSD) - A program identified by the Clean Air Act to prevent air quality and visibility degradation and to remedy existing visibility problems. Areas of the country are grouped into three classes which are allowed certain degrees of pollution depending on their uses. National Parks and Wilderness Areas meeting certain criteria are "Class 1" or "Clean Areas" in that they have the smallest allowable increment of degradation.

production - one of the ways functions are described; resources which are "manufactured" within the system (i.e. plant growth, animal reproduction, snags falling and becoming down woody material).

productive - The ability of an area to sustain ecological values and to provide goods and services.

public land - Land for which title and control rests with a government---Federal, state, regional, county, or municipal.

public involvement - The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision making.

range - Land on which the principle natural plant cover is composed of native grasses, forbs, and shrubs that are valuable as forage for livestock and big game.

range management - The art and science of planning and directing range use intended to yield the sustained maximum animal production and perpetuation of the natural resources.

range of variability (Also called the historic range of variability or natural range of variation.) - The components of healthy ecosystems fluctuate over time. An ecosystem within its historic range of variability is resilient to natural and man-caused disturbances. The range of sustainable conditions in an ecosystem is determined by time, processes (such as fire), native species, and the land itself. For instance, ecosystems that have a 10 year fire cycle have a narrower range of variation than ecosystems with 200-300 year fire cycle. Past management has placed some ecosystems outside their range of variability. Future management should move such ecosystems back toward their natural, sustainable range of variation.

Ranger District - The administrative sub-unit of a National Forest that is supervised by a District Ranger who reports directly to the Forest Supervisor.

raptor - A bird of prey, such as a eagle, owl, or hawk.

RARE II - Roadless Area Review and Evaluation. The national inventory of roadless and undeveloped areas within the National Forests and Grasslands.

recharge - The addition of water to ground water by natural or artificial processes.

recreation visitor days (RVD) - Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

reforestation - The restocking of an area with forest trees, by either natural or artificial means, such as planting.

regeneration - The renewal of a tree crop by either natural or artificial means. The term is also used to refer to the young crop itself.

Regional Forester - The official of the USDA Forest Service responsible for administering an entire region of the Forest Service.

residual stand - The trees remaining standing after an event such as selection cutting.

resilience - The ability of an ecosystem to maintain diversity, integrity, and ecological processes following a disturbance.

Responsible official - The Forest Service employee who has been delegated the authority to carry out a specific planning action.

restoration (of ecosystems) - Actions taken to modify an ecosystem to achieve a desired, healthy, and functioning condition.

retention - A visual quality objective; management activities are not visually evident; activities repeat form, line, color, and texture characteristics found in the landscape.

revegetation - The re-establishment and development of a plant cover by either natural or artificial means, such as re-seeding.

riparian area - Riparian areas consist of riparian ecosystems, aquatic ecosystems, and wetlands. They are generally associated with lakes, reservoirs, estuaries, potholes, marshes, springs, bogs, wet meadows, and intermittent or perennial streams where free and unbound water is available.

riparian ecosystem - The ecosystems around or next to water areas that support unique vegetation and animal communities as a result of the influence of water.

ROD - Record of Decision. A official document in which a deciding official states the alternative that will be implemented from a prepared EIS.

ROS - Recreation Opportunity Spectrum. The land classification system that categorizes land by its setting and the probable recreation experiences and activities it affords.

rotation - The number of years required to establish and grow timber crops to a specified condition of maturity.

salvage harvest - Harvest of trees that are dead, dying, or deteriorating because they are overmature or have been materially damaged by fire, wind, insects, fungi, or other injurious agents, before the wood becomes unmerchantable.

sanitation harvest - The harvest of dead, damaged or susceptible trees done primarily to prevent the spread of pests or disease and to promote forest health.

sapling - A loose term for a young tree more than a few feet tall and an inch or so in diameter that is typically growing vigorously.

sawtimber - Trees that are 9 inches in diameter at breast height or larger that can be made into lumber.

scale- In ecosystem management, it refers to the degree of resolution at which ecosystems are observed and measured.

scenic attractiveness - The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegetation pattern. Reflects varying visual perception attributes of variety, unity, vividness, intactness, coherence, mystery, uniqueness, harmony, balance, and pattern. It is classified as:

- A - Distinctive. (Extraordinary and special landscapes, that are attractive and stand out from common landscapes.)
- B - Typical or common. (Prevalent, usual, or widespread landscapes within a landscape province, also landscapes with ordinary and routine scenic attractiveness.
- C - Indistinctive. (Areas that have low scenic quality)

scenic class - A system of classification describing the importance or value of a particular landscape or portions of that landscape.

scenic integrity - A measure of the degree to which a landscape is visually perceived to be complete. The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued by constituents for its aesthetic appeal.

scoping - The ongoing process to determine public opinion, receive comments and suggestions, and determine issues during the environmental analysis process. It may involve public meetings, telephone conversations, or letters.

second growth - Forest growth that was established after some kind of interference with the previous forest crop, such as cutting, fire, or insect attack.

sensitive species - Plant or animal species which are susceptible to habitat changes or impacts from activities. The official designation is made by the USDA Forest Service at the Regional level and is not part of the designation of Threatened or Endangered Species made by the US Fish and Wildlife Service under the Endangered Species Act.

seral - The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.

shelterwood - A cutting method used in a more or less mature stand, designed to establish a new crop under the protection of the old.

short-term - Unless otherwise defined, short-term refers to less than 10 years.

silvicultural system - The cultivation of forests; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.

silviculture - The art and science that promotes the growth of single trees and the forest as a biological unit.

site preparation - The general term for removing unwanted vegetation, slash, roots, and stones from a site before reforestation. Naturally occurring wildfire, as well as prescribed fire can prepare a site for natural regeneration.

size class - One of the three intervals of tree stem diameters used to classify timber in the Forest Plan data base. The size classes are: Seedling/Sapling (less than 5 inches in diameter); Pole Timber (5 to 7 inches in diameter); Sawtimber (greater than 7 inches in diameter)

skidding - Hauling logs by sliding, not on wheels, from stump to a collection point.

skid trail - narrow path on which logging equipment travel when moving logs from the forest to a designated landing location.

skier days - Twelve skier hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

skyline logging - A logging system used to remove timber from steep slopes. Logs are brought up-slope on a suspended cable, or skyline. Since the weight of the log is completely or partially supported by the cable, there is little disturbance to soil or other vegetation.

slash - The residue left on the ground after timber cutting or left after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

slump - A landslide where the underlying rock masses tilt back as they slide from a cliff or escarpment.

snag - A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

soil compaction - The reduction of soil volume. For instance, the weight of heavy equipment on soils can compact the soil and thereby change it in some ways, such as in its ability to absorb water.

soil productivity - The capacity of a soil to produce a specific crop. Productivity depends on adequate moisture and soil nutrients, as well as favorable climate.

special use permit - A permit issued to an individual or group by the USDA Forest Service for use of National Forest land for a special purpose. Examples might be a Boy Scout Jamboree or a mountain bike race.

stand - A group of trees that occupies a specific area and is similar in species, age, and condition.

standards and guidelines - Requirements found in a Forest Plan which impose limits on natural resource management activities, generally for environmental protection.

stocking level - The number of tree in an area as compared to the desirable number of trees for best results, such as maximum wood production.

stringer - A strip of vegetation different from surrounding vegetation, such as a stringer of aspen in a area of spruce.

structure - How the parts of ecosystems are arranged, both horizontally and vertically. These parts include vegetation patches, edge, fragmentation, canopy layers, snags, down wood, steep canyons, rocks in streams, and roads. For example, structure might reveal a pattern, or mosaic, or total randomness of vegetation.

suitability - The appropriateness of certain resource management to an area of land. Suitability can be determined by environmental and economic analysis of management practices.

successional stage - A stage of development of a plant community as it moves from bare ground to climax. The grass-forb stage of succession precedes the woody shrub stage.

succession - The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.

sustainability - The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

sustainable - The yield of a natural resource that can be produced continually at a given intensity of management is said to be sustainable.

sustained yield - The yield that a renewable resource can produce continuously at a given intensity of management.

Soil and Water Conservation Practices (SWCPs) - Refer to BMPs.

target - A National Forest's annual goals for accomplishment for natural resource programs. Targets represent the commitment the Forest Service has with Congress to accomplish the work Congress has funded, and are often used as a measure of the agency's performance.

thermal cover - Cover used by animals against weather. For elk, thermal cover can be found in a stand of coniferous trees at least 40 feet tall with a crown closure of at least 70%.

thinning - A cutting made in an immature stand of trees to accelerate growth of the remaining trees or to improve the form of the remaining trees.

threatened species - Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

Total Suspended Particulate Matter (TSP) - See Particulate Matter, PM-10.

tractor logging - A logging method that uses tractors to carry or drag logs from the stump to a collection point.

treatment area - The site- specific location of a resource improvement activity.

understory - The trees and woody shrubs growing beneath the overstory in a stand of trees.

uneven-aged management - Actions that maintain a forest or stand of trees composed of intermingling trees that differ markedly in age. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

unsuitable lands - Forest land that is not managed for timber production. Reasons may be matters of policy, ecology, technology, silviculture, or economics

Unwanted Wildland Fire - See Wildfire.

vegetation management - Activities designed primarily to promote the health of forest vegetation for multiple-use purposes.

vegetation type - A plant community with distinguishable characteristics.

vegetative structural stage - A method of describing the growth stages of a stand of living trees. It is based on tree size (DBH- diameter at breast height) and total canopy cover. The stages are:

Grass/forb/shrub (VSS 1) = 0-1 inch DBH; Seedling/sapling (VSS 2) = 1-5 inches DBH; Young Forest (VSS 3) = 5-12 inches DBH; Mid-Aged Forest (VSS 4) = 12-18 inches DBH; Mature Forest (VSS 5) = 18-24 inches DBH; Old Forest (VSS 6) = 24+ inches DBH.

vertical diversity - The diversity in a stand that results from the different layers or tiers of vegetation. It is a measure of structure.

viable population - The number of individuals of a species sufficient necessary to ensure the long-term existence of the species in natural, self-sustaining populations, adequately distributed throughout its range.

viewshed - Total visible area from a single observer position, or the total visible area from multiple observer positions. Viewsheds are accumulated seen-areas from highways, trials, campgrounds, towns, cities, or other viewer locations.

visual quality objective - A set of measurable goals for the management of forest visual resources used to measure the amount of visual contrast with the natural landscape caused by human activities.

visual resource - A part of the landscape important for its scenic quality. It may include a composite of terrain, geologic features, or vegetation

watershed - The entire region drained by a waterway (or into a lake or reservoir). More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflow at that point.

water table - The upper surface of groundwater. Below it, the soil is saturated with water.

water yield - The runoff from a watershed, including groundwater outflow.

wetlands - Areas that are permanently wet or are intermittently covered with water.

wilderness (Wilderness Area) - Undeveloped federal land retaining its primeval character, without permanent human habitation or improvements. It is protected and managed to preserve its natural condition. Wilderness Areas are designated by Congress.

Wildfire - An unwanted wildland fire.

windthrow - Trees uprooted by wind.

yarding - Moving the cut trees from where they fell to a centralized place (landing) for hauling away from the stand.

ZOI (Zone of Influence)- The area influenced by Forest Service management activities.

APPENDIX 1

A.1. MONITORING PLANS BY RESOURCE

Listed below are the monitoring items, time periods, and follow-up activities by resource. Implementation monitoring is generally completed within the first year after activity completion. Effectiveness monitoring is generally completed 2-5 years after an activity.

A.1.1. VEGETATION

SPECIFIC ITEM TO BE MONITORED: Regeneration of aspen harvest treatment areas

PURPOSE FOR MONITORING: Did the sites that were harvested successfully regenerate with natural aspen at stocking levels specified in the silvicultural prescription?

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Complete ground reconnaissance sufficient to estimate stocking rates and seedling health followed by stocking surveys for the purpose of certification.

FREQUENCY: Complete reconnaissance annually following completion of treatment and conduct stocking survey within 3-5 years of treatment.

DURATION: Until sites are certified.

ESTIMATED MONITORING COSTS: $6.00/acre

REPORTING PROCEDURES: RMSTAND sampling procedures, reported in SAR report.

RESPONSIBILITY: Silviculturist

RED-FLAG VARIATION: Does not meet certification standards.

SPECIFIC ITEM TO BE MONITORED: Implementation of layout/marking guide

PURPOSE FOR MONITORING: To determine if timber sale preparation is adequately implementing the planned aspen harvest treatment as specified in the environmental analysis.

TYPE OF MONITORING: Implementation

METHODS/PARAMETERS: Ground reconnaissance of treatment units evaluating selected location and designation of material. Review contract package

FREQUENCY: Review each unit at least once, depending on outcome.

DURATION: This review would be completed prior to advertisement of timber sale(s).

ESTIMATED MONITORING COSTS: $1.00/acre

REPORTING PROCEDURES: Vegetation Monitoring File

RESPONSIBILITY: Silviculturist/Sale Preparation Forester

RED-FLAG VARIATION: Silvicultural prescription not met.

RESOURCE AREA: Treatment sites

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Reservoir

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: Prior to sale contact preparation, preferably while marking crews are in site.

SPECIFIC ITEM TO BE MONITORED: Have the contract provisions/sale administration practices adequately implemented the silvicultural prescription within aspen harvest units.

PURPOSE FOR MONITORING: To determine effectiveness of contract measures

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Reconnaissance during the harvest activities.

FREQUENCY: Throughout sale contract.

DURATION: During timber sale contract.

ESTIMATED MONITORING COSTS: $1.00/ac (completed with diameter distribution monitoring.

REPORTING PROCEDURES: Filed in the Vegetation Monitoring File/Location folders.

RESPONSIBILITY: Silviculturist

RED-FLAG VARIATION: Treatment does not meet silvicultural prescription sufficiently, and prevents successful regeneration of aspen harvest sites.

RESOURCE AREA: Treatment sites

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Reservoir

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: 2000

SPECIFIC ITEM TO BE MONITORED: Prescribed fire treatments in the aspen sites.

PURPOSE FOR MONITORING: Did the prescribed fire treatment meet the silvicultural prescription? Was the treatment successful in regenerating the sites back to aspen seral stage? Is fence construction necessary to protect aspen regeneration?

TYPE OF MONITORING: Implementation/Effectiveness

METHODS/PARAMETERS: General field reconnaissance during the burning followed by annual field reconnaissance. Fifth year stocking survey following completion of the burning.

FREQUENCY: Once during the burning, annual reconnaissance following, and five growing seasons following completion of the burn.

DURATION: 0-5 years.

ESTIMATED MONITORING COSTS: $6.00/acre

REPORTING PROCEDURES: Vegetation Monitoring File

RESPONSIBILITY: Silviculturist

RED-FLAG VARIATION: Does not meet silvicultural prescription standards.

RESOURCE AREA: Project Area

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Res.

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: 2000

SPECIFIC ITEM TO BE MONITORED: Cutting of understory conifer trees within aspen maintenance treatment sites.

PURPOSE FOR MONITORING: Did the removals of conifer trees effectively reduce competition of conifers on aspen? Were the removals successful in limiting damage to the residual aspen trees?

TYPE OF MONITORING: Implementation/Effectiveness

METHODS/PARAMETERS: General field reconnaissance as treatments are implemented.

FREQUENCY: As treatments are implemented, which may occur over several years.

DURATION: 0-5 years.

ESTIMATED MONITORING COSTS: $6.00/acre

REPORTING PROCEDURES: Vegetation Monitoring File

RESPONSIBILITY: Silviculturist

RED-FLAG VARIATION: Does not meet silvicultural prescription standards.

RESOURCE AREA: Project Area

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Res.

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: 2000

SPECIFIC ITEM TO BE MONITORED: Prescribed fire treatments in the ponderosa pine and mixed conifer sites.

PURPOSE FOR MONITORING: Did the prescribed fire treatment meet the silvicultural prescription? Was the treatment successful in reducing biomass and under story competition while retaining overstory?

TYPE OF MONITORING: Implementation/Effectiveness

METHODS/PARAMETERS: General field reconnaissance.

FREQUENCY: Once during the burning and 3 years after completion (estimate residual tree mortality).

DURATION: 0-3 years.

ESTIMATED MONITORING COSTS: $1.00/acre

REPORTING PROCEDURES: Vegetation Monitoring file

RESPONSIBILITY: Silviculturist

RED-FLAG VARIATION: Does not meet silvicultural prescription standards.

RESOURCE AREA: Project Area

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Res.

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: 1999

SPECIFIC ITEM TO BE MONITORED: Site Prep/Prescribed fire treatments in the pinyon/juniper sites

PURPOSE FOR MONITORING: Did the prescribed fire treatment meet the silvicultural prescription? Was the treatment successful in creating a savannah like appearance of scattered mature PJ interspersed with understory vegetation or a mosaic of openings especially in drainage bottoms? Are burn areas in need of seeding? Are noxious weeds establishing?

TYPE OF MONITORING: Implementation/Effectiveness

METHODS/PARAMETERS: General field reconnaissance.

FREQUENCY: Once during the burning and three growing seasons following completion of the burn.

DURATION: 0-5 years.

ESTIMATED MONITORING COSTS: $1.00/acre

REPORTING PROCEDURES: Vegetation Monitoring File

RESPONSIBILITY: Silviculturist/Wildlife Biologist

RED-FLAG VARIATION: Does not meet silvicultural prescription standards. Greater than 25% of PJ burn acres require seeding. Noxious weeds are increasing and competing successfully with naturals.

RESOURCE AREA: Project Area

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Res.

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: 2000

SPECIFIC ITEM TO BE MONITORED: Prescribed fire treatments in the sagebrush sites.

PURPOSE FOR MONITORING: Did the prescribed fire treatment meet the silvicultural prescription? Was the treatment successful in regenerating the sites back to grass/forbs seral stage? Are burn areas in need of seeding? Are noxious needs establishing?

TYPE OF MONITORING: Implementation/Effectiveness

METHODS/PARAMETERS: General field reconnaissance.

FREQUENCY: Once during the burning and two growing seasons following completion of the burn.

DURATION: 0-5 years.

ESTIMATED MONITORING COSTS: $1.00/acre

REPORTING PROCEDURES: Vegetation Monitoring File

RESPONSIBILITY: Silviculturist/Wildlife Biologist

RED-FLAG VARIATION: Does not meet silvicultural prescription standards. Greater than 25% of sagebrush burn area require seeding. Noxious weeds are increasing and competing with naturals.

RESOURCE AREA: Project Area

WATERSHED/ECOLOGICAL UNIT: Sand Creek/Bear Creek

USGS QUAD: Roger Peak/Jacobs Res.

ADMINISTRATIVE UNIT: Escalante Ranger District

EXPECTED IMPLEMENTATION DATE: 1999

SPECIFIC ITEM TO BE MONITORED: Off Highway Vehicle (OHV) use.

PURPOSE FOR MONITORING: To determine the extent to which road closures, trailhead construction, and motorized trail designations are aiding in the management of OHV use within the project area.

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Visual observations and photo record of OHV use, visitor counts on motorized trails, and closure enforcement records,

FREQUENCY: Data would be periodically collected throughout the use period, typically the summer and fall seasons.

DURATION: Data would be collected the first season prior to implementation of the management activity, the first season following completion of the activity, and the third season following completion of the management activity.

ESTIMATED MONITORING COSTS: $4,500 ($1,500 per year for three years).

REPORTING PROCEDURES: Results of monitoring are compiled in the Annual Dixie National Forest Monitoring Report.

RESPONSIBILITY: District Recreation Staff Officer.

RED-FLAG VARIATION: Less than 25 percent improvement in OHV management.

A.1.3. VISUAL QUALITY

SPECIFIC ITEM TO BE MONITORED: Visual Quality Objectives

PURPOSE FOR MONITORING: To determine how well stated Visual Quality Objectives have been met along Concern Level 1 and 2 roads and trails within the project area.

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Observation and mapping of resultant VQO's one full growing season after completion of treatments.

FREQUENCY: Record findings one time at .1 mile intervals on Concern Level 1 and 2 roads and trails.

DURATION: Compile findings one full growing season following completion of treatment activities.

ESTIMATED MONITORING COSTS: $1,200

REPORTING PROCEDURES: Annual Dixie National Forest Monitoring Report

RESPONSIBILITY: East Zone Landscape Architect

RED-FLAG VARIATION: Less than 90% compliance with stated VQO's.

A.1.4. WATERSHED

SPECIFIC ITEM TO BE MONITORED: Macroinvertebrates in Bear Creek.

PURPOSE FOR MONITORING: Collection of macroinvertebrate data for establishment of baseline data, evaluation of best management practices, and assessment of stream biological integrity and ecosystem (and riparian) classification.

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Collection of samples and riparian evaluation will be done in accordance with references. Macroinvertebrates will be analyzed at the National Ecosystem Monitoring Center.

FREQUENCY: Collection 2-5 times per year.

DURATION: 2-5 years.

ESTIMATED MONITORING COSTS: $750/year/site

REPORTING PROCEDURES: Results of the macroinvertebrate monitoring will be included in the annual water quality report.

RESPONSIBILITY: Hydrologist

RED-FLAG VARIATION: Does not meet Forest Plan standard for BCI.

PROJECT NAME: Pretty Tree Bench Project

REFERENCES

Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters, US EPA (11/90), # EPA/600/4-90/030

Rapid bio-assessment protocols for use in streams and rivers: Benthic Macroinvertebrates and Fish, US EPA (1989), # EPA/440/4-89-001

Integrated Riparian Evaluation Guide, Intermountain Region March 1992

SPECIFIC ITEM TO BE MONITORED: Macroinvertebrates in Lake Creek.

PURPOSE FOR MONITORING: Collection of macroinvertebrate data for establishment of baseline data, evaluation of best management practices, and assessment of stream biological integrity and ecosystem (and riparian) classification.

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Collection of samples and riparian evaluation will be done in accordance with references. Macroinvertebrates will be analyzed at the National Ecosystem Monitoring Center.

FREQUENCY: Collection 2-5 times per year.

DURATION: 2-5 years.

ESTIMATED MONITORING COSTS: $750/year/site

REPORTING PROCEDURES: Results of the macroinvertebrate monitoring will be included in the annual water quality report. .

RESPONSIBILITY: Hydrologist

RED-FLAG VARIATION: Does not meet Forest Plan standard for BCI.

PROJECT NAME: Pretty Tree Bench Project

REFERENCES

Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters, US EPA (11/90), # EPA/600/4-90/030

Rapid bio-assessment protocols for use in streams and rivers: Benthic Macroinvertebrates and Fish, US EPA (1989), # EPA/440/4-89-001

Integrated Riparian Evaluation Guide, Intermountain Region March 1992

A.1.5. WILDLIFE

SPECIFIC ITEM TO BE MONITORED: Snags and defective trees to be retained in aspen harvest units for maintaining populations of cavity-nesting wildlife species on prescribed aspen harvest units.

PURPOSE FOR MONITORING: To assure that prescribed numbers and size of snags and defective trees are retained during implementation of harvest operations.

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Visual count per harvest unit.

FREQUENCY: Twice.

DURATION: Once during operation to determine any adjustments; once post-harvest operation.

ESTIMATED MONITORING COSTS: $1500.

REPORTING PROCEDURES: Results of monitoring compiles in harvest contract file.

RESPONSIBILITY: District Wildlife Biologist and District Timber Sale Official.

RED-FLAG VARIATION: Greater than 10% variation below prescribed numbers of retained snags and defective trees of adequate size.

SPECIFIC ITEM TO BE MONITORED: Artificial seeding on portions of prescribed burns in pinyon-juniper and sagebrush for erosion control and big game forage production.

PURPOSE FOR MONITORING: To determine success of seeding to meet intended objectives of providing erosion control and forage for big game.

TYPE OF MONITORING: Effectiveness.

METHODS/PARAMETERS: Visual observations of germination and survival success the first year and of success for seeded vegetation to persist.

FREQUENCY: Five times; twice during growing first growing season to determine success of germination and survival until maturity, twice the second growing season to determine second year survival and production, once the third growing season to determine third year survival and production.

DURATION: Twice the first growing season after seeding; twice during the second growing season.

ESTIMATED MONITORING COSTS: $2220; first year: $888, second year.

REPORTING PROCEDURES: Results of monitoring compiled in District project files, in District botany files, and to project responsible officials (District Ranger and Forest Supervisor).

RED-FLAG VARIATION: Inadequate germination and/or survival to meet objectives of either erosion control and/or forage production.

A.1.6. FIRE

SPECIFIC ITEM TO BE MONITORED: Fuels, and prescribed fire objectives

PURPOSE FOR MONITORING: To determine if fuels were reduced to between 5-7 tons per acre initially. Also after 3-5 years to determine if additional fuels have buildup, exceeding the desired condition of five to seven tons per acre.

TYPE OF MONITORING: Effectiveness

METHODS/PARAMETERS: Ten percent of the area would be inventoried, a minimum of twenty points/plots would be surveyed. Data would be collected by observation with use of photo series, or Browns surface fuels inventory method.

FREQUENCY: Twice

DURATION: Once after burning, then again in 3-5 years.

ESTIMATED MONITORING COSTS: $2,000

REPORTING PROCEDURES: Annual Dixie National Forest Monitoring Report

RESPONSIBILITY: District Fire Management Officer, and Silviculturist.

RED-FLAG VARIATION: Less than five to seven tons per acre of fuels across the project area.

APPENDIX 2

SCOPING COMMENT ANALYSIS

A.2 REVIEW OF COMMENTS

A.2.1 RESPONDENTS

Twenty-two letters and two phone calls were received in response to the scoping notices on the Pretty Tree Bench Project. These responses are identified numerically in order in which they were received by the district.

Letter Number	Individual, Agency, Organization or Business
1	Ed Storey, State of Utah Division of Forestry
2	Hell's Backbone Ranch L.L.C., Boulder, UT
3	Utah Forest Products, Inc., Escalante, UT
4	The Wilderness Society, Denver, CO
5	Southern Utah Wilderness Alliance, Cedar City, UT
6	Walter Rudolph, Boulder, UT
7	USDI - Fish & Wildlife Service, Salt Lake City, UT
8	Robert Cummings, Boulder, UT
9	Richard Jensen, Bicknell, UT
10	Boulder Town Council, Boulder, UT
11	State of Utah, Division of Forestry, Fire and State Lands, Richfield, UT
12	Rex Thomas Griffith, Teasdale, UT
13	Hal D. and Athalia Jensen, Antimony, UT
14	Clair Veater, Panguitch Lake, UT
15a	Stoltze Aspen Mills, Sigurd, UT
15b	Stoltze Aspen Mills, Sigurd, UT
16	Mark Belles, Rowlett, TX
01	Garkane Power Association, Richfield, UT
02	Cathy Dahms, Albuquerque, NM
03	Walter Rudolph, Boulder, UT
04	Haws Cattle Co., Boulder, UT
05	Southern Utah Wilderness Alliance, Cedar City, UT
06	Garfield County, Panguitch, UT
07	Scott Hatfield, Boulder, CO
08	Nevada United Four Wheelers Association, Las Vegas, NV
09	Utah Environmental Congress, Salt Lake City, UT

A.2.2 COMMENT ANALYSIS

The pertinent comments of each response were numbered, summarized, categorized, and documented as to how each individual concern would be addressed in the analysis.

Comment Review Key

A. Significant Issues
   1. Indicator of compliance
   2. Component of Affected Environment
   3. Component of Effects of Implementation
   4. Component of No Action
   5. Component of New Alternative / Issue

B. Non-Significant Issues
   1. Outside the Scope of the Proposed Action
   2. Decided by law, regulations, policy, Forest Land and Resources Management Plan
   3. Irrelevant to the decision
   4. Not supported by science
   5. Limited in extent, duration, and intensity
   6. Misunderstood the Proposed Action
   7. Does not accomplish the Purpose and Need
   8. Does not understand the Purpose and Need
   9. Clarification of the Proposed Action
   10 Statement of an opinion
   11. Described in the Purpose and Need
   12. Clarification of the Purpose and Need

C. Proposed Action
   1. Supports the Proposed Action
   2. Component of the Proposed Action
   3. Component of Mitigation and/or Monitoring

A.2.3 RESPONSE AND ASSIGNMENTS

Following is the documentation as to how each of the comments will be handled during the analysis process. The bold face type identifies the **summarized public comment**.

Letter Number	Comment Number	Category	Comment and Response - Initial Scoping (Prescribed burn only)
01	1	B6	**Why do we want to maintain sage brush community type, is it not an invading species.** Restoration of the sage brush is based on the PFC assessment which indicated a need to increase age class diversity within this vegetation type.
	2	B9	**What would be the climax of the P/J type**. Within the P/J, P/J is the climax species.
02	1	B2	**What is the desired condition for this area**. Desired future condition are described in the PFC assessment.

2	B1	**Your planning process (forest plan revision) should solicit from all interested stakeholders.** All known interested stakeholders were contacted as part of the public participation process.
3	B11	**What the desired future condition should be.** The desired future condition is described in the purpose and need.
4	C2	**We think that the new desired condition should emphasize wildlife habitat, and the preservation of old growth areas.** The proposed action does emphasize diversity of wildlife habitats and maintenance of old growth over time.
5	A2	**It is our considered opinion that this area is in fact in the desired condition.** The affected environment describes the existing condition. The PFC desired conditions.
6	C2	**The prescribed burns may increase sedimentation in run-off and streams, filling ditches and interfering with irrigation.** The effects of the purposed burn would be described in Chapter 4.
7	B2	**If the project results in injury to private property owners, the FS will need to have the ability to compensate those owners.** Liability of the government is already established by law.
8	C2	**How grazing will affect the project.** The effects of the purposed treatment would be described in Chapter 4.
9	C2	**Burned vegetation will impact the beauty of the landscape.** The effects of the purposed treatment would be described in Chapter 4.
10	C2/B2	**How will the prescribed burns affect air quality in the Escalante Basin, and how will these affects be mitigated.** The effects of the purposed treatment would be described in Chapter 4. All State laws would be followed.
11	B10	**The FS should obtain photographic evidence to support its claim of recent increase of PJ.** Existing condition are described in the affected environment. Past photos have been used as reference (project file).
12	B6	**Determine if additional roadways will be required to implement the process.** No additional road construction is proposed.
13	C3	**Describe what type of seed will be replanted.** Types of seed are described in the seeding white paper found in the project file.
14	B3	**Portion of the estimated costs to reseeding.** Funding is based on outyear budgets. Reseeding costs are estimated to be less than 5% of the total project cost.

	15	B9/C2	**Will reseeding require mechanical treatment, and how long after burning will reseeding occur.** Method and timing of reseeding would be described in the proposal.
	16	B2	**Antiquities**. Archaeology surveys would be conducted prior to implementation.
	17	A3	**A thorough economic analysis**. The economic affects will be described in Chapter 4.
	18	B3	**FS commit to employing local residents**. Likely be a mix of both local and non-local individuals.
	19	A3	**Disclose what other actions the FS will purpose for this area, and adjacent areas, in the next 10 years**. Described within the cumulative effects in Chapter 4.
	20		**Threatened and endangered species**. Disclosed in effected environment and environmental consequences.
	21	A3	**Effects of water quality in downstream waters**. Effects will be disclosed in Chapter 4.
	22	B2	**Obtain permission from State to degrade these waters**. Under the State's Non-Point Source Plan, waters will not be degraded.
	23	A3	**Current range conditions, identify those, and determine how these problems may be affected by the proposed burns**. The effects of grazing will be described in Chapter 4.
	24	B3	**What funding sources does the FS intend to use for this project**. Funding is based on outyear budgets, and potential partners.
	25	B10	**The FS should decide to produce an EIS**. An EIS will be prepared.
03	26	C1	**Supports project**. Thank you.
	27	C2	**Commercial quality trees may be lost**. Described in the economical analysis in Chapter 4, and Chapter 2, Alternatives.
	28	A5	**Any timber in the PTB area should be considered for its saw timber value prior to burning**. An alternative was addressed which would use commercial harvest within the aspen, this alternative was eliminated due to the costs associated with accessing.
04	29	C1	**We Support the use of fire and restoration of ecosystem integrity**. Thank you.
	30	B10	**Don't use ecosystem restoration as a purpose to increase livestock grazing**. The purpose and need of this project is disclosed in Chapter 1.
	31	C2	**Include in your objectives the restoration of both stand structure and function**. Stand structure would be a component of restoring forest function.

	32	A3	**Analyze this project in the context of the monument's watershed and to ensure that any proposed action works to enhance rather than degrade the monuments aquatic and other resources**. Discussed in Chapter 4.
	33	A3	**We urge to remove livestock, until native understory has been restored to facilitate low intensity fires**. Effects of livestock on the proposal are discussed in Chapter 4, and Chapter 2, Alternatives.
	34	C2	**This project should not be view as a mechanisms to improve forage so that livestock grazing can be increased**. The purpose and need are discussed in Chapter 1.
	35	A3	**Restore native understory, avoid pasture grasses and exotic species**. Discussed in Chapter 4.
	36	A3	**Don't increase erosion or sedimentation levels.** Discussed in Chapter 4.
	37	B1	**The wilderness act allows for prescribed burning in the wilderness**. No burning is planned within the wilderness. Management ignited fires are not allowed.
05	38	B6	**Roadless and unroaded areas must be preserved, and no new roads constructed in these areas**. No new road construction is proposed.
	39	A5	**Roadless and other unroaded areas must be preserved from tree cutting, and other intrusive activities**. Discussed in Chapter 4. No policy requirement for this request. Analyzed in No Action.
	40	C3	**Riparian areas and wildlife habitat must be protected**. Discussed in Chapter 4.
	41	C2/A3	**What sort of reseeding is planned, including seed mixture, and how reseeding be accomplished**. Discussed in Chapter 2 and 4, and the project file white paper.
	42	B11	**Why is cutting and burning within the PJ proposed, and is it proposed to increase forage for domestic livestock**. Described within the purpose and need.
	43	B11	**The EA should address the purpose and/or benefit of removing conifer, in favor of aspen groves**. Discussed within Chapter 4.
06	44	C3	**Hand felling and burning of trees and shrubs will denude vegetation. Ditches would be vulnerable to heavy precipitation and runoff, silting up the ditches**. Project design and mitigations have minimized this.

	45	A3/C3	**Grazing rights and fences within the burn will be affected**. Discussed within the Chapter 4, and Chapter .
	46	B2/C3	**Burning could jeopardize private property**. Mitigations have minimized this concern.
07	47	B2	**Aquarius Paintbrush may occur in the vicinity**. Surveys have been completed in potential habitat areas.
	48	A5	**Revegetation prescription comprised of native species are recommended**. Discussed in Chapter 2.
	49	C3	**Monitoring of vegetation conditions for noxious weeds**. Included in the monitoring plan.
	50	C3	**Identify and avoid existing raptor nests**. Included in mitigations.
	51	A2	**Maintain existing riparian habitat for southwestern willow flycatcher**. Suitable habitat not in project area.
	52	B10	**Protect natural attributes of the Grand-Staircase Escalante National Monument**. Discussed in Chapter 4.
08	53		**No Comment**. Thank You
09	54	B1	**Utilize pinyon juniper as a wood product prior to burning**. The IDT developed various alternatives which utilized both commercial and non-commercial treatment methods to accomplish objectives. There is no commercial local market demand for PJ.
	55	C2	**Goals for recreation should be addressed**. Included In The Proposed Action and in Chapters 2
	56	C2	**Bikes and ATV's trails can be left as roads with seasonal use**. Seasonal closures of road would still be available for this use as described by alternatives.
	57	C1	**Overall if these considerations can be developed in the proposed action, then I support the proposed action**. Consideration have been included in the proposed action, alternative and there effects will be analyzed.
10	58	C1	**Interest and approval**. Thank you
11	59	C1	**I applaud efforts**. Thank you
	60	B2	**Contact private land owners adjacent to project area**. Accomplished through scoping.
12	61	C1	**I support your efforts**. Thank you
	62	C2	**Is there any work for the private sector i.e. cutting firewood, logs and poles**. Various opportunities for treatments both commercial non-commercial which could be utilized by the private sector within the various action alternatives.
13	63	C1	**We are very much in favor**. Thank You

14	64	C1	**Supports proposed action**. Thank you .
15a	65	C1	**In support of the proposed action**. Thank you
15b	66	C2	**Project could include aspen harvest**. See revised proposed action which was scoped (2nd scoping). Aspen harvest is now included.
	67	A3	**Harvest in aspen will maintain a desired ecology**. Effect of implementation will be described in the environmental consequences.
	68	A2	**Aspen mills depend upon a continual supply of aspen, including FS**. Component of the effected environment.
16	69	A5	**A complete ban on construction of roads is an excellent plan.** Will be addressed in an alternative.
	70	B2/A5	**No tree cutting of any kind should be permitted in wilderness or roadless areas**. Law prohibits commercial tree cutting of any kind in a wilderness area. Cutting in roadless areas will be addressed in an alternative.
	71	A3	**Reseeding should be done only with native seed. Much of the difficulties associated with attainment of PFC for rangeland on the Colorado Plateau has resulted from non-native seed.** Will be addressed in the environmental consequences (Alt. 2).
	72	C2	**It is unclear what is intended by "management cutting". If this means wholesale chaining of other widespread removal of large flora, then the plan should be revised to use pruning and other less disturbing methods.** Management activities including cutting are disclosed in the Proposed Action.
	73	A4	**Plans to permit commercial cutting may significantly effect the habitat of the area during recovery after prescribed burns. Burned-but-left-standing and downed trees provide significant habitat for insects, reptiles, birds, and small mammals. To achieve a PFC these natural habitats should be allowed to remain in place.** Effects of the burn and tree cutting will be addressed in the analysis.
	74	A5	**Complete closure of Road Draw may be more restrictive than necessary, but seasonal closure should be strongly considered to enhance big game opportunities.** Will be addressed in an alternative.

Letter Number	Comment Number	Category	Comment and Response Revised Proposed Action, Second round of Scoping, June 30th, 1998 scoping
01	1	C1	**No objection to your proposal in general.** Thank you.
	2	C3	**We ask that the control burn near the lower Boulder Plant be monitored very close.** Covered in Chapter 2 (mitigations).
02	3	B8	**General lack of information about the purpose and need of the project, as well details of the project itself.** The purpose and need of the project as well as the proposed action are described in Chapter 2.
	4	B12	**How can I respond to a proposal that does not address the needs of the overall ecosystem.** The proposed action was taken from past PFC assessments from a larger landscape (Ref. project file), and assesses large scale needs.
	5	B11	**Humans are a part of the ecosystem and their needs should be identified.** Both human and ecologic needs are considered in the PFC assessment process, which was the basis for the purpose and need for this project.
	6	B6	**Time frames not identified.** The scoping notice identified that implementation would take place over the next 1-8 years.
	7	B9	**Treatment is to be followed by appropriate seeding.** Seeding will be done with native and/or non-native species to control erosion, and provide for big game forage.
	8	B9	**What is the goal for the PJ community.** The goal of the treatment within the PJ is to develop a mosaic of structural stages. The 3.0-3.5m acres of PJ is approximately 1/5 of the existing PJ found within the project area. The design of this treatment would create a variety of structural stage development and stand densities.
	9	B10/C2	**Concerned that increased levels of deer and elk will be at the expensive of other wildlife species.** The purposed action is designed to maintain healthy populations of all species.
	10	B9/A3	**Concern with use of non-native species, do not support use of exotic species.** Seeding will be done with native and/or non-native species to control erosion, and provide for big game forage.
	11	C2/B2	**Concern that archaeological sites in the area may be buried.** Archaeological surveys have been conducted on the majority of the area, the remaining area would be surveyed prior to any treatment. SHPO concurrence has been received.

	12	B10	**Concern that harvested aspen is not being fenced.** Based on past district experience, cutting provides sufficient residual slash to prevent unacceptable levels of browsing damage. Fencing, if needed based on monitoring will be used.
	13	B2	**Concerned that burning will adversely affect water quality.** Addressed in Chapter 4.
	14	B6	**Concerned that there would be no management activities in the wilderness area, seasonal closures.** No proposed actions within the wilderness.
03	15	C3	**Burning may cause the ditch to fill with debris.** Will be handled as a mitigation.
04	16	B2	**Additional road closures, these roads provide access to repair fences and other range practices.** Would be addressed within the term permit and annual operating plan.
	17	C3	**Fencing of aspen north of Haws pasture, this 700 acres contains the best grazing within the Bear Creak Pasture. Fencing this area would be serious to livestock operations. Who would maintain fence and keep the cattle out.** The number of cattle would not be reduced. Fencing would only be constructed if necessary to ensure success of the aspen regeneration. The FS would maintain it, the fence would remain for 5-10 years. The permittee would be responsible for removing the cattle.
	18	B1	**Extension of the Birch Spring pipeline.** This is outside of the proposed action, and does not meet the purpose and need.
	19	C1	**Supports proposed action.** Thank you
05	20	A2	**It appears that all or portions of three inventoried Roadless area, and wilderness area are within the boundaries of the project area.** Discussed in Chapter 3.
	21	B10	**Scoping was insufficient in disclosing Roadless areas.** Scoping notice included Map F which showed that there would be no road construction or reconstruction in any of the suspension category areas identified in the proposed Interim Regulations 2.12.13.
	22	A5	**Inventoried Roadless areas constitute extraordinary circumstance, and must be given special consideration.** Discussed in Chapter 4.
	23	A5/A3	**Roadless and undeveloped areas are necessary to sustain healthy watersheds, and any proposed development in a Roadless area must necessarily address the impact of future wilderness designation and to the watershed health.** Discussed in Chapter 4.

24	B1	**Similar goals could be attained by removing or reducing the number of livestock and then allowing natural fire to burn**. Settled by the 1995 Escalante Ranger District Grazing Permit Issuance EA. District presently assessing the role of natural fire.
25	B3	**Does the Escalante Ranger District have a fire plan in which natural fires to these areas are addressed**. The NFMA process is scheduled to be completed end of fiscal year 1999. The fire plan should be completed by year end 2000.
26	A2/A3	**Request that concerns and questions expressed relative to PJ treatments be addressed in the NEPA document.** Concerns will be addressed in the Environmental Analysis.
27	A2/A3	**Requests that concerns and questions expressed relative to aspen burns and aspen regeneration harvest**. Concerns will be addressed in the Environmental Analysis.
28	A2/A3	**Requests that concerns and questions expressed relative to aspen non-commercial cutting.** Concerns will be addressed in the Environmental Analysis.
29	A2/A3	**Requests that concerns and questions expressed relative to seeding.** Concerns will be addressed in the Environmental Analysis.
30	B1/A3	**Analysis of the impacts of the proposed actions on the Box-Death Hollow Wilderness Area**. No management activities are planned within the Box-Death Hollow Wilderness Area. Effects such as air quality are discussed in Chapter 4.
31	A3	**Maps must be reissued so that the public is made aware of where the Roadless areas are in relation to the proposed actions**. Will include new maps in the appendix.
32	A2	**Are the Sweetwater roads user created**. Majority of the roads were constructed in connection with timber management activities. The Road Draw Road could be a historic route between Loa and Boulder.
33	B10	**These roads must be permanently closed if they are within an inventoried Roadless area**. Inventory Roadless areas are only inventories and not management direction. There is no existing policy which directs that these roads must be closed.
34	A2/A3	**Request that concerns and questions expressed regarding OHV, and seasonal closures vs. permanent closures**. Concerns will be addressed in the Environmental Analysis.

06	35	A3	**Some of the routes affected by the proposal maybe county/RS 2477**. Discussed in Chapter 2 and 4.
	36	A5	**Suspension announced by FS Jan 22, 1998 may not be valid for some of the routes**. The proposed action and alternative 1 addresses this concern. Suspension discussed in Chapter 4.
	37	B2	**Definitions for "constructed" and "reconstructed" must be consistent with transportation standards**. Definition for construction and reconstruction can be found in the Forest Service Manuals and Handbooks.
	38	B2/A3	**Boundary suspension categories adjacent to roads and other transportation facilities needs to be accurately defined**. Analysis of the Interim Road Rule is included in Chapter 4.
	39	A2	**Prior to closure of any facility, an exhaustive search needs to be conducted to verify no underlying rights exists**. An extensive search was preformed.
07	40	A5	**Concerned commercial aspen cuts are for industrial, not ecological purposes**. Discussed in Chapter 2 and 4.
	41	B6	**Aspen clearcuts would be used for livestock benefit.** The purpose of the aspen clearcuts is to provide a young age class component in the aspen community. If grazing livestock and wildlife threatens the regeneration success the area will be fenced. This is covered within the monitoring plan, and the area will be monitored
	42	A5	**Roads need closure and obliteration, especially near the wilderness.** The proposed action and action alternatives proposed differing levels of access management.
	43	A5	**ORV traffic should be limited**. Alternatives 1, 2 and 3 and the Proposed Action reduces OHV traffic in the analysis area.
	44	B6	**Many of these burns are meant to provide short term livestock pasture, not long term ecosystem health.** The purpose of the proposed action is not to provide livestock pastures.
	45	A5	**Preclude industrial extraction**. Included as an alternative.(No Action and Alternative 1).
08	46	A3	**Oppose closing roads**. Closure of any roads will be addressed during the environmental analysis.

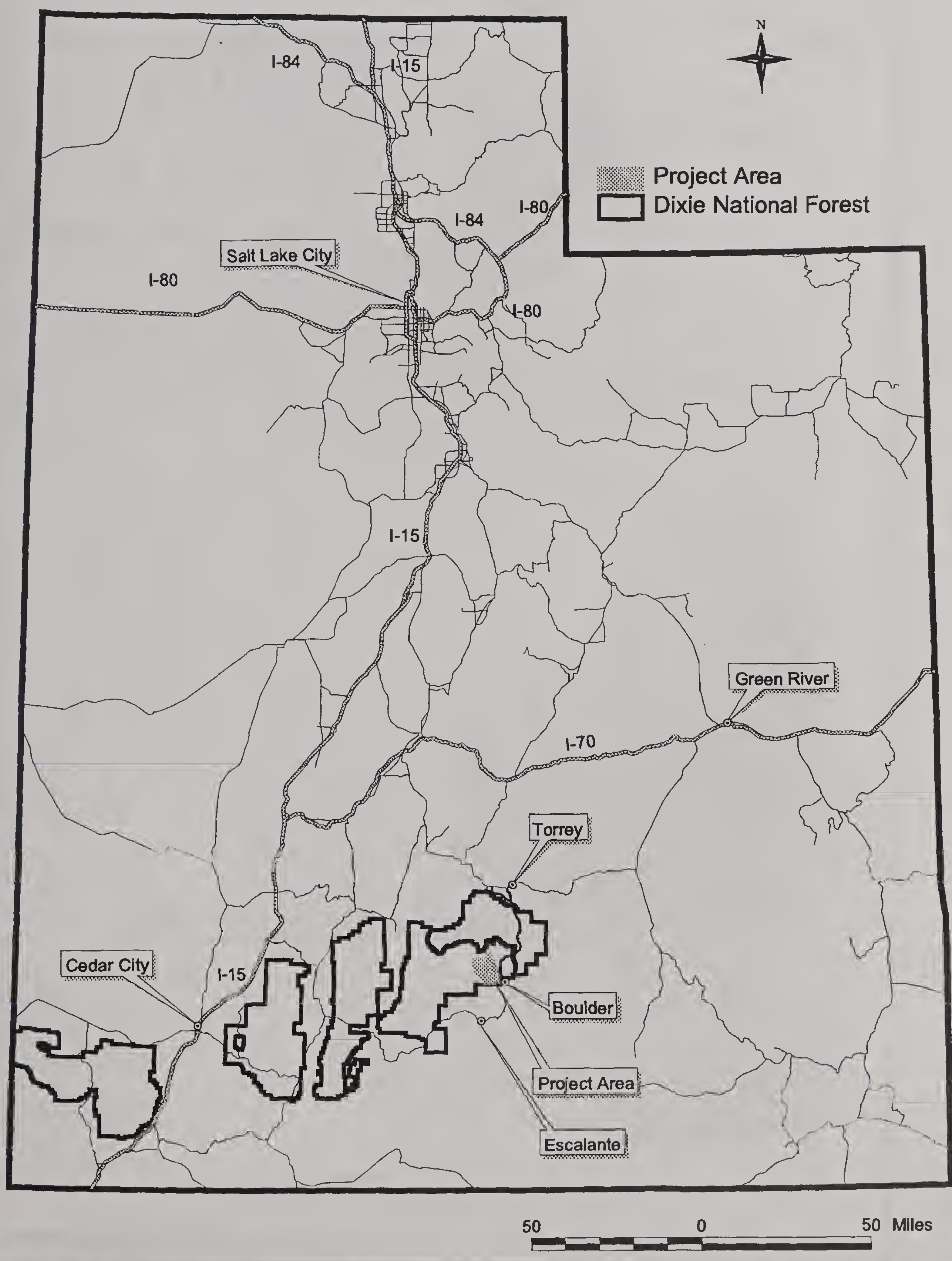
Letter Number	Comment Number	Category	Comment and Response
	47	B10	**Closure of roads on FS land require public hearing/the FS policy lately seems to be close any road anytime without public notice**. Public hearing is not required by law. Public notice is required and has been provided through scoping notices and notice of intent.
	48	B1	**Want a policy of "open" unless posted "closed"**. Currently under consideration at the forest level. Included in the No Action Alternative.
	49	C1	**In support of a OHV loop trail.** Thank you.

Letter Number	Comment Number	Category	Comment and Response March 17, 1999 Scoping
09	50	A5	**Allow natural fire to accomplish objectives.** Discussed in Chapter 2
	51	A2/A3/-A5	**Response comments regarding livestock grazing.** Discussion of grazing is addressed in Chapters 2,3 and 4.
	52	A5	**Approves fencing 700 acres of aspen.** Discussed in Chapter 2
	53	A5	**Wants long term answer to how historical "cool burns" will be maintained.** Discussed in Chapter 2. Life of the project is expected to last 1-8 years.
	54	C3	**Response comments regarding "riparian management areas".** Project mitigations for riparian areas are provided
	55	A2/A3	**Response for acknowledgment of TE&S species existence and cumulative effects.** Discussed in Chapters 3 and 4.
	56	B2	**Request for Biological Evaluation.** Completion decided by policy/regulation.
	57	C3/A3	**Response comment regarding noxious weeds and native vegetation competition.** Discussed in Chapter 2 and Chapter 4

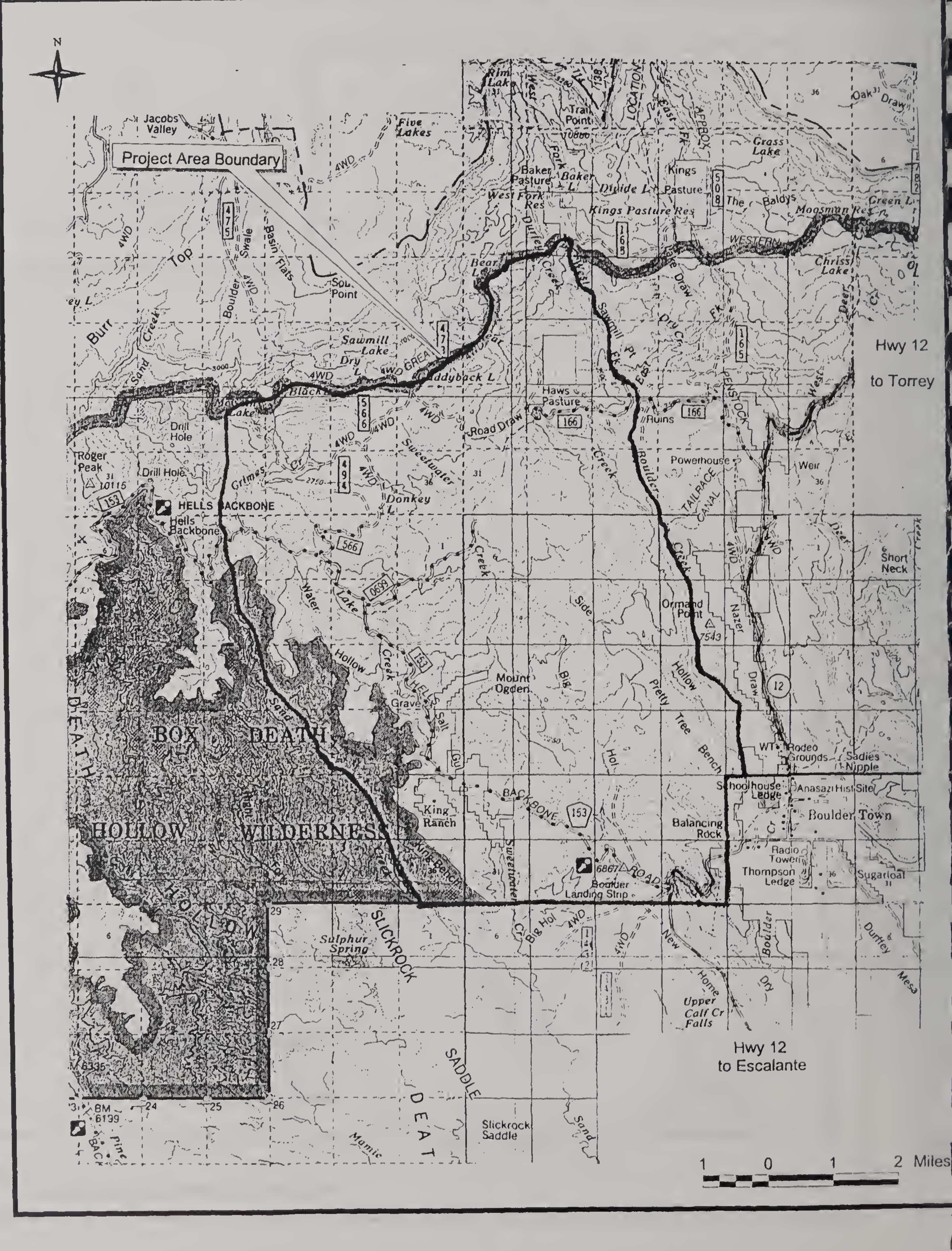
APPENDIX 3

MAPS

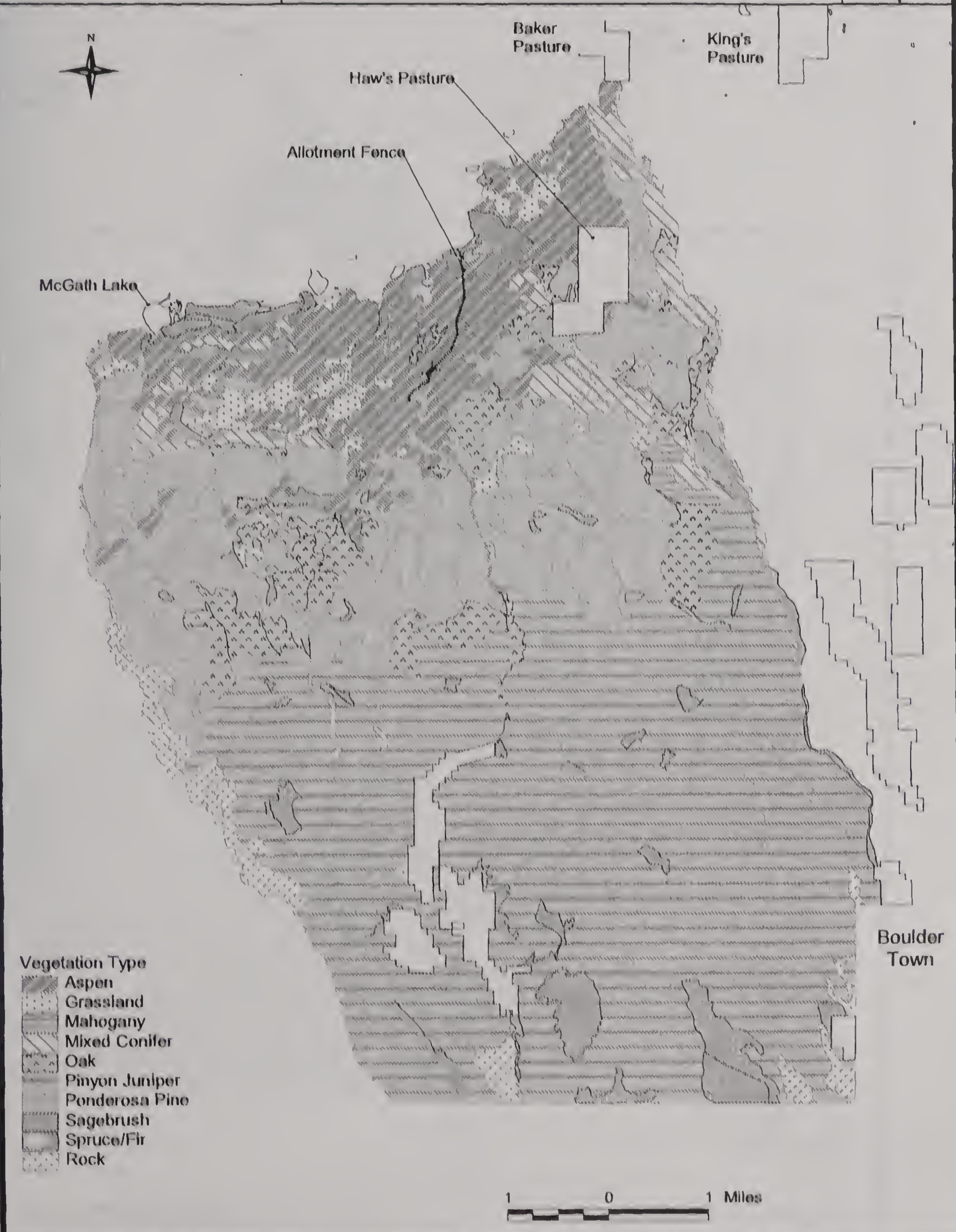
Pretty Tree Bench Project 3/29/99	**Vicinity Map**	App. 3 Map A



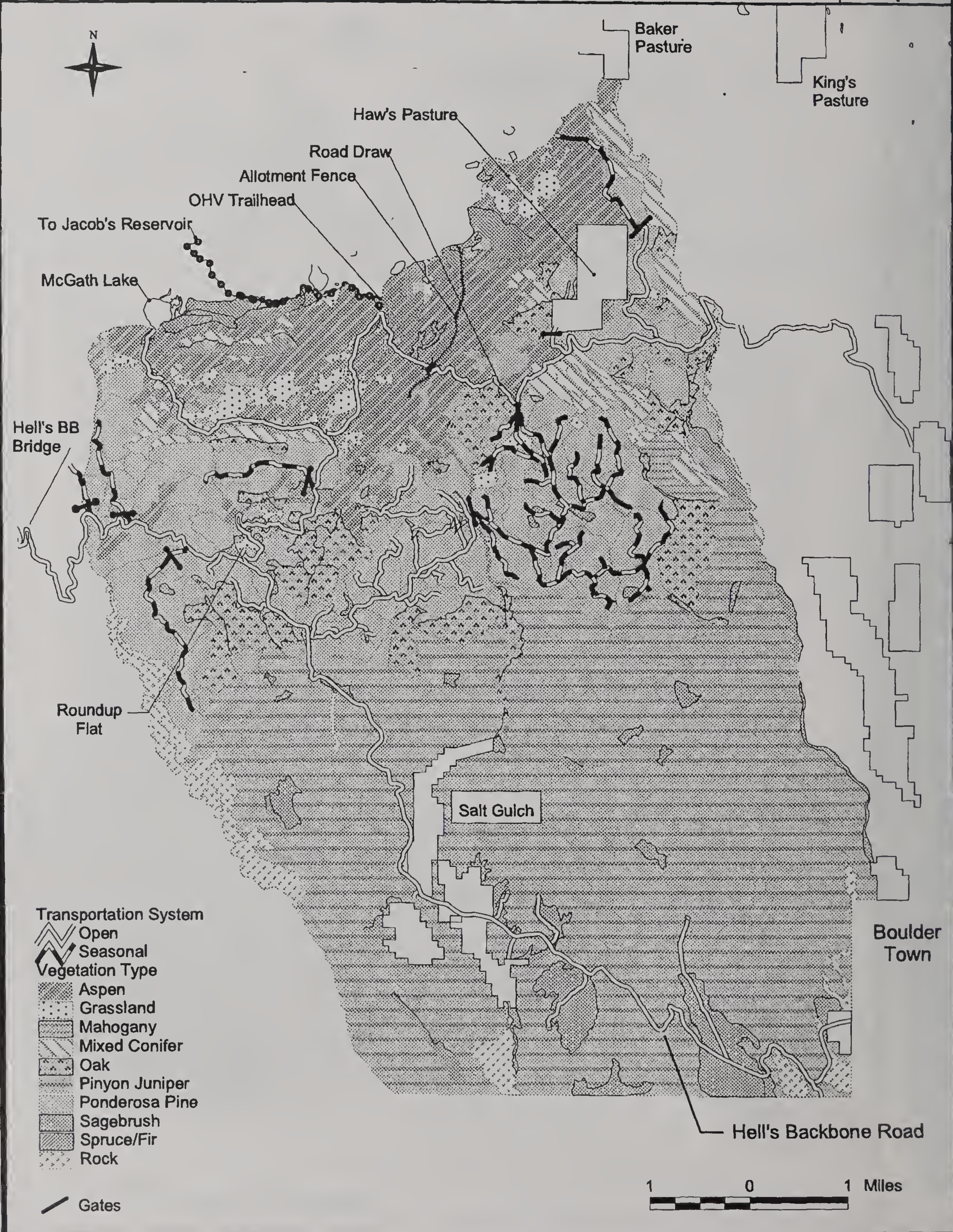
Pretty Tree Bench Project 3/29/99	**Analysis Area**	App. 3 Map B



Pretty Tree Bench Project 3/26/99	**Vegetation Types**	App. 3 Map C



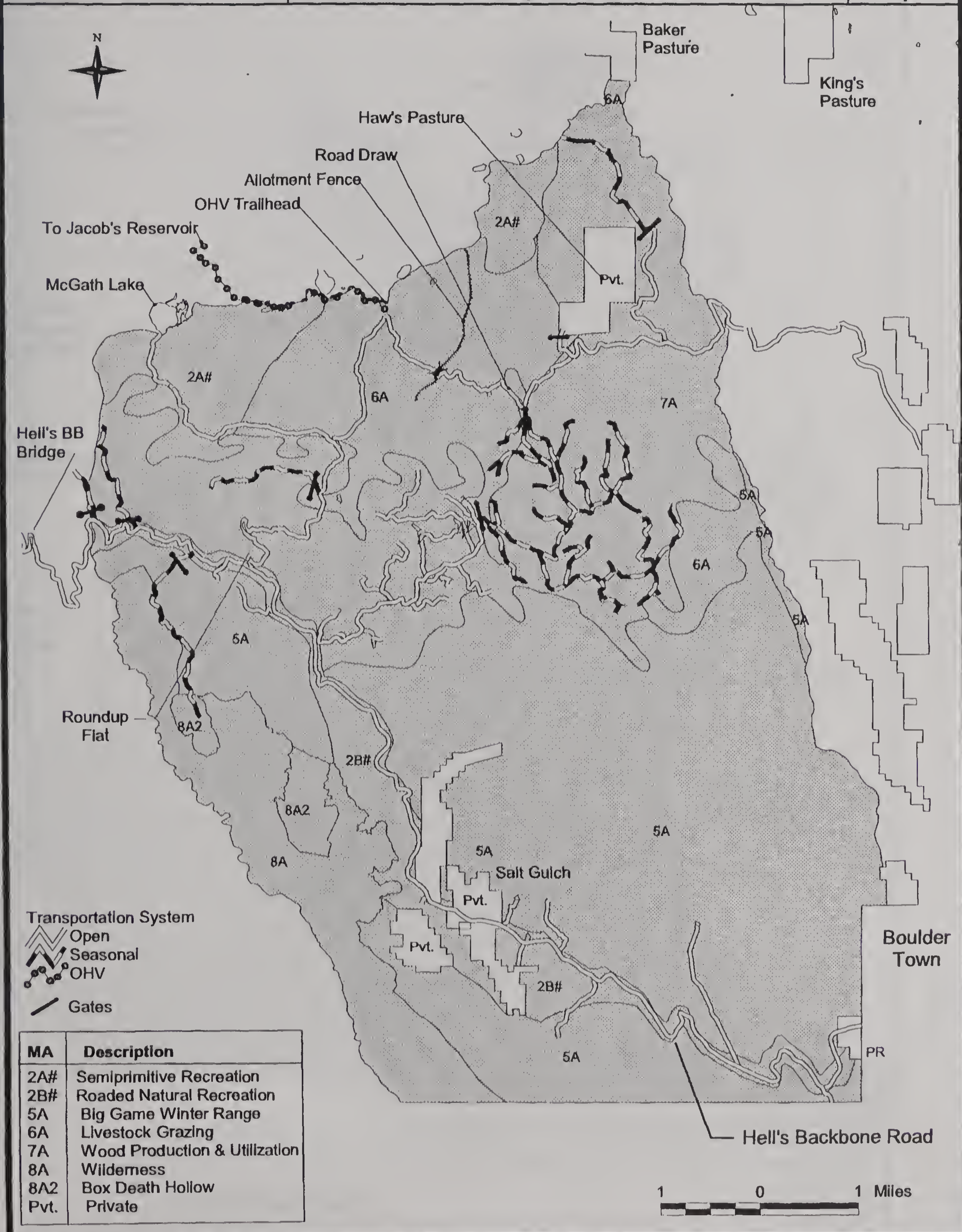
Pretty Tree Bench Project 3/26/99	**Existing Transportation System & Vegetation Types**	App. 3 Map D



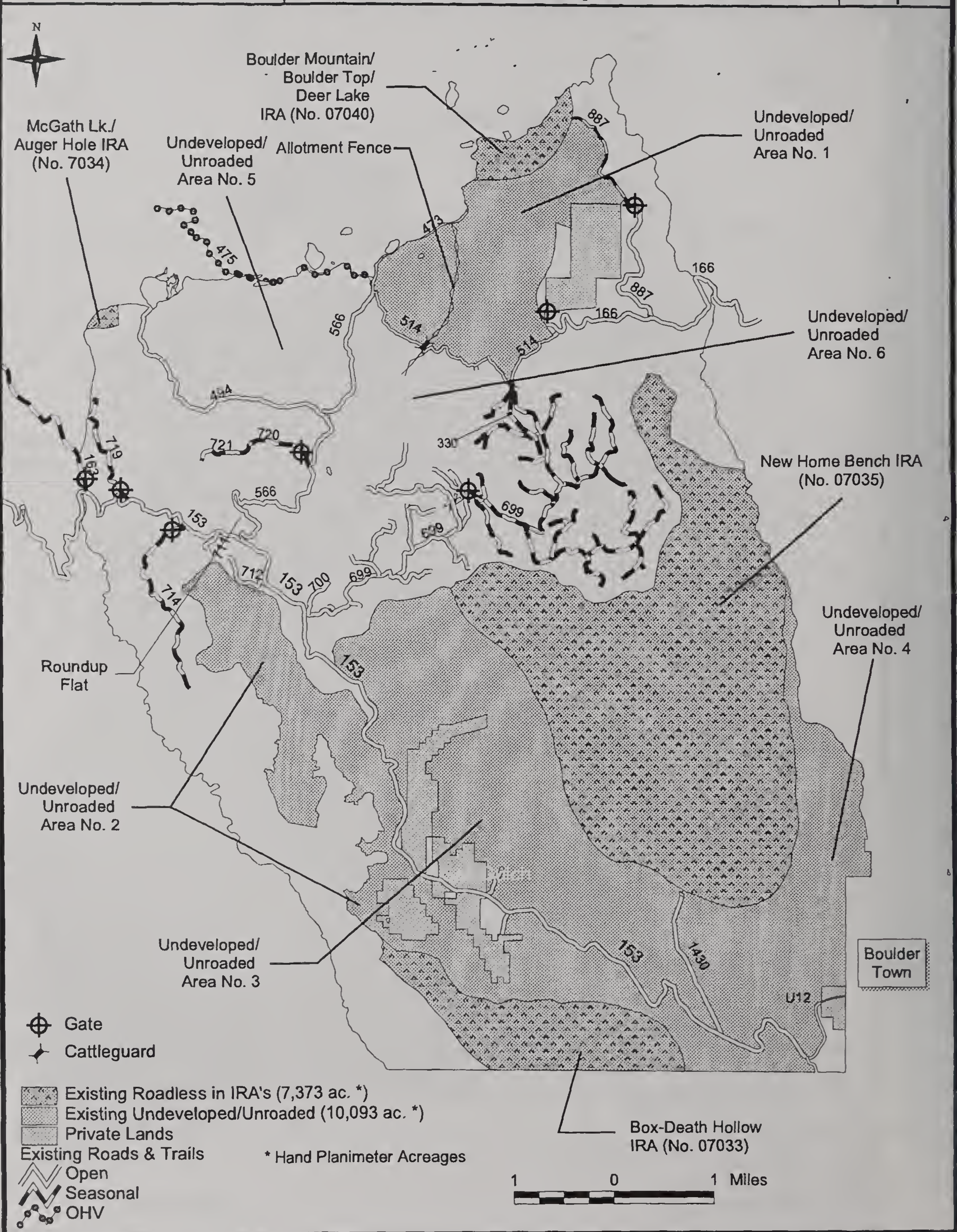
Pretty Tree Bench Project 4/1/99

Existing Transportation System and Management Areas

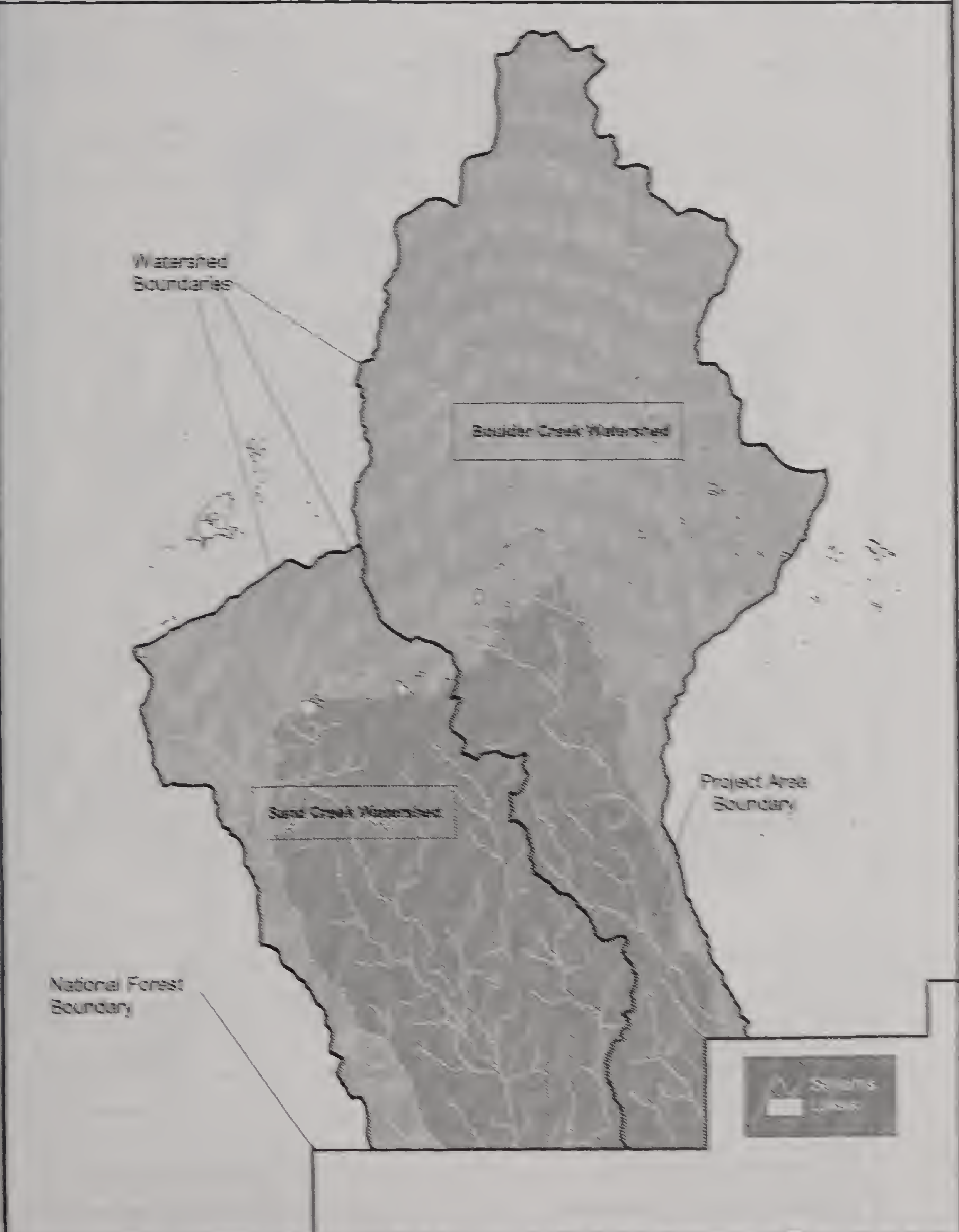
App. 3 Map E



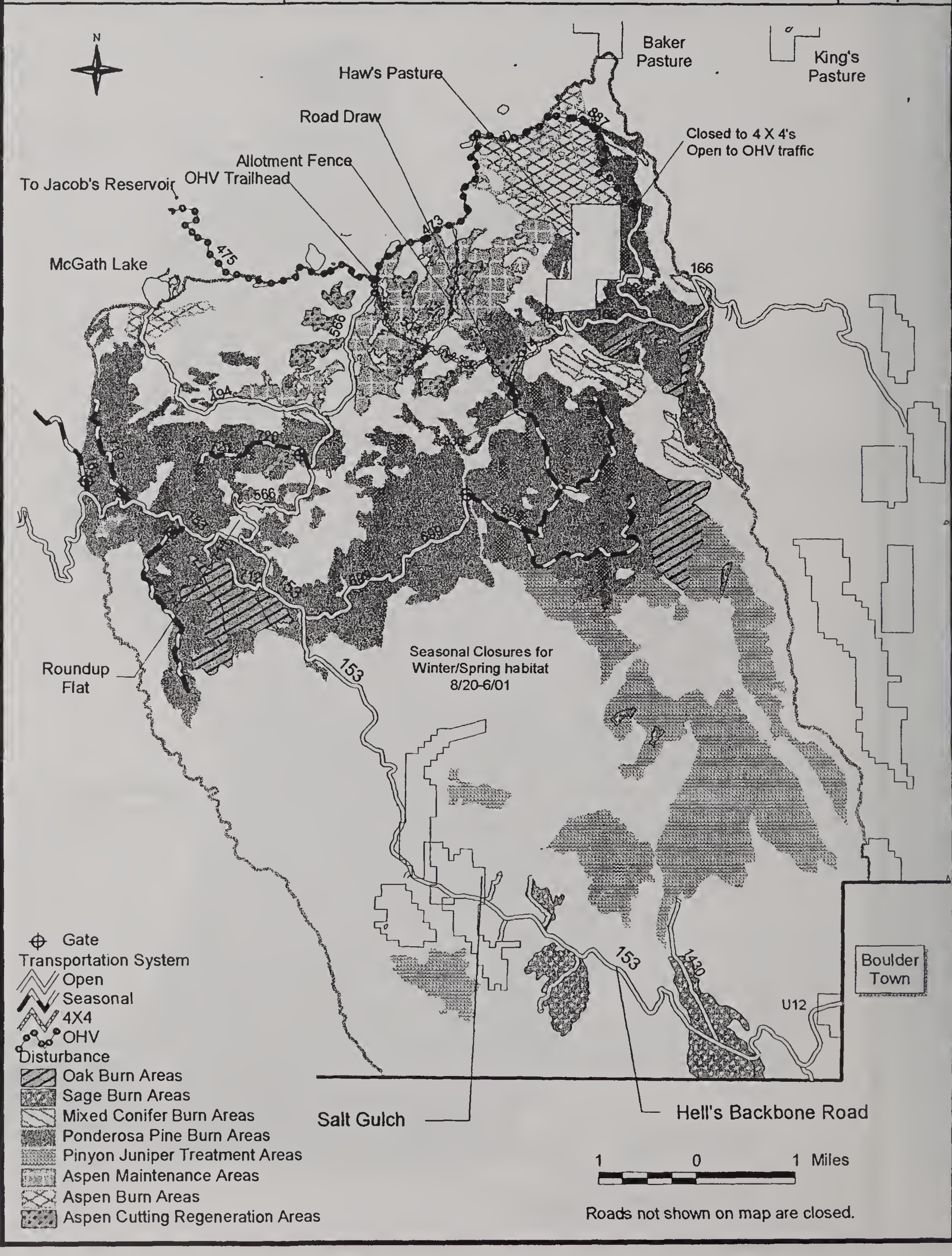
Pretty Tree Bench Project 01/13/00	**Existing Inventoried Roadless Areas (IRA's) & Other Exisitng Undeveloped/Unroaded Areas**	App. 3 Map F



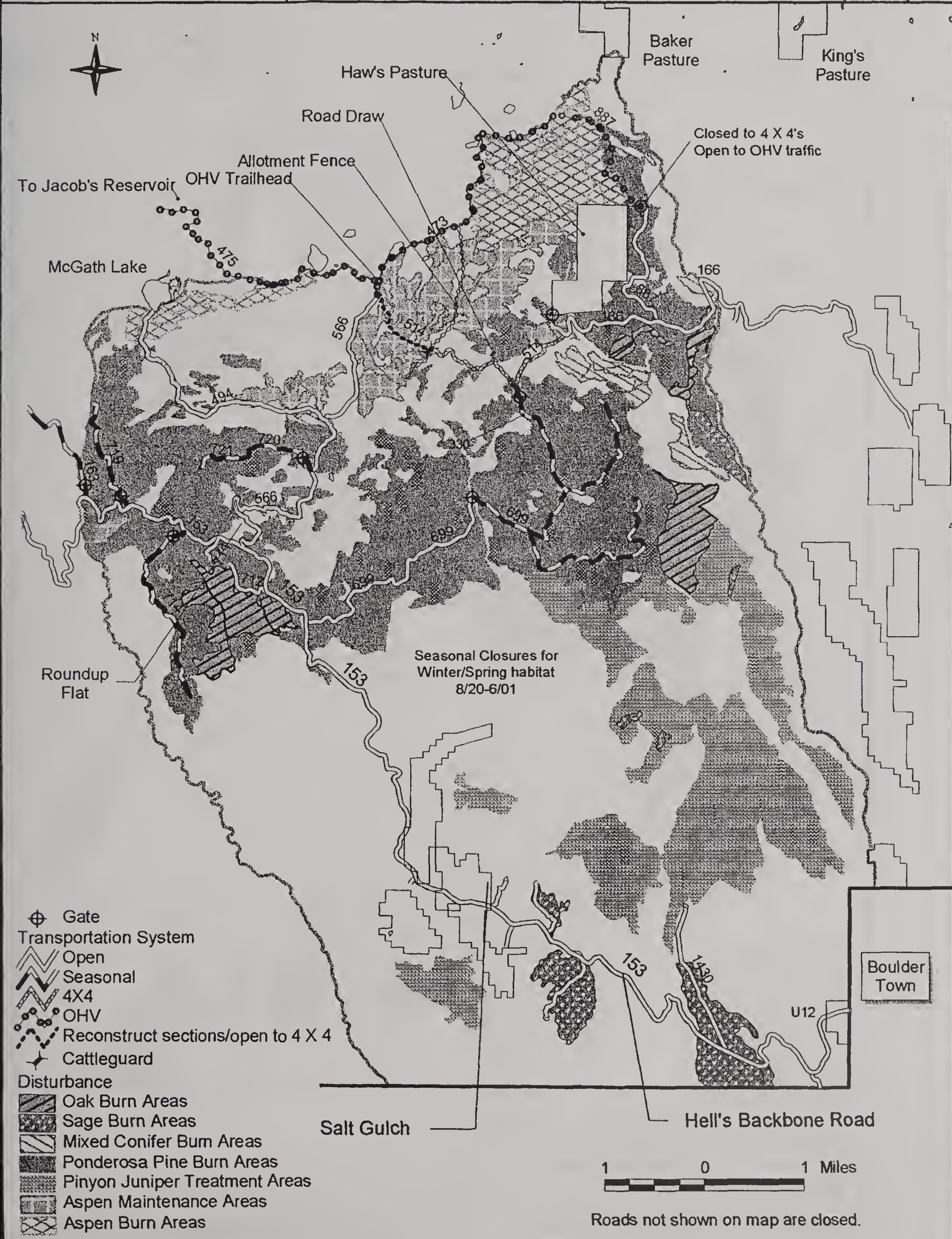
Pretty Tree Bench Project 3/12/99	**Watershed Analysis Area**	App. B Map G

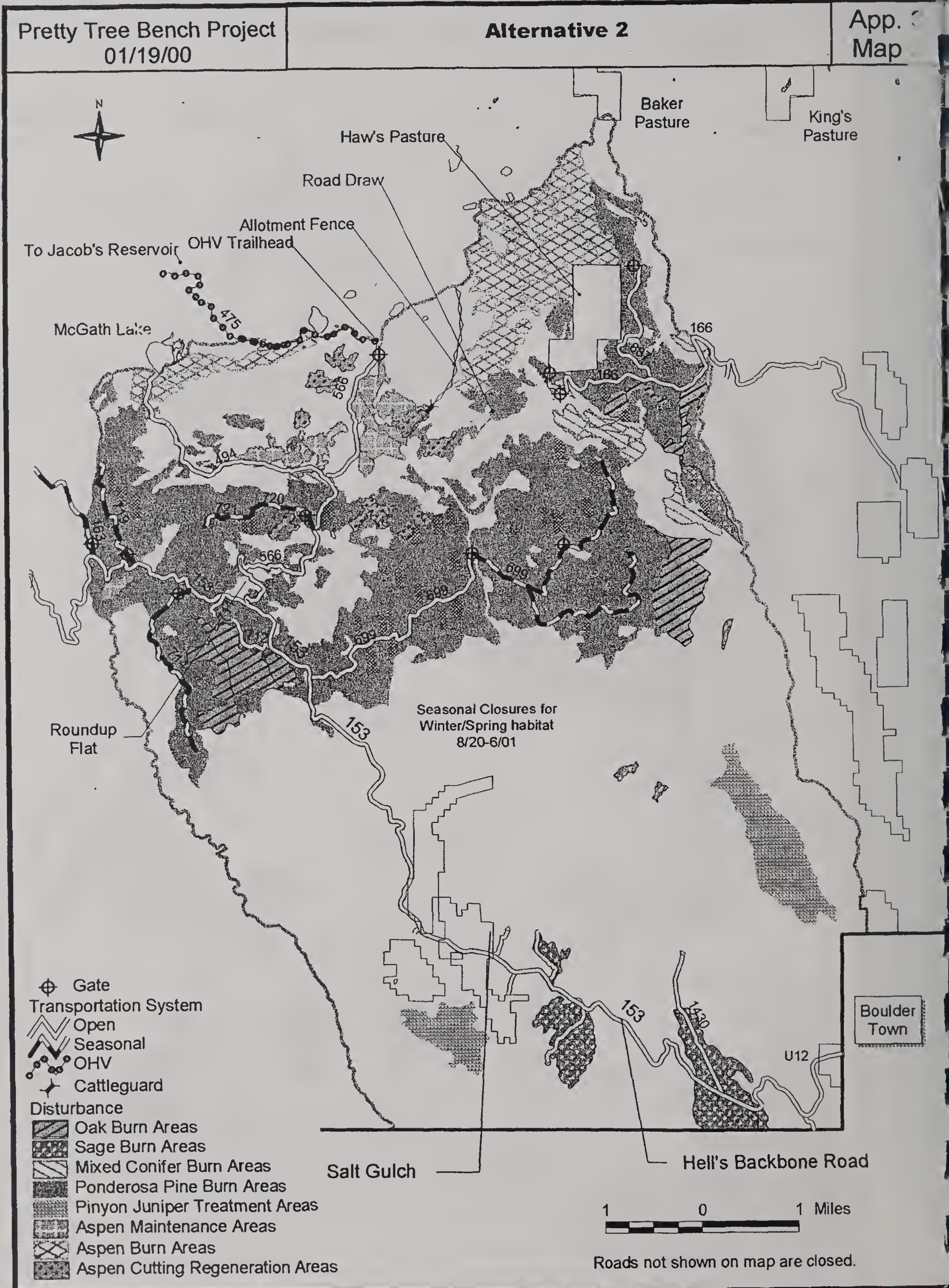


Pretty Tree Bench Project 01/19/00	**Proposed Action**	App. 3 Map H



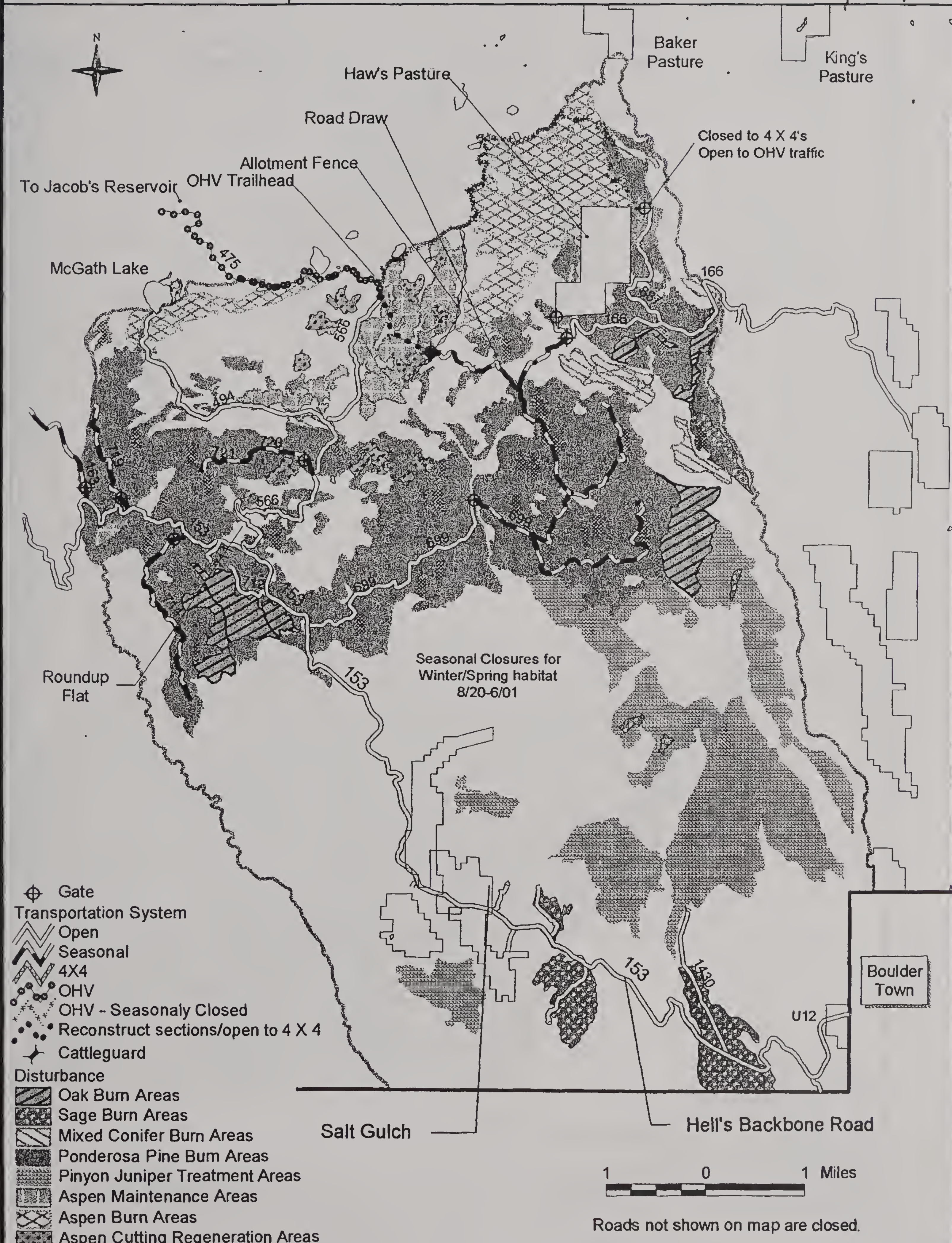
Pretty Tree Bench Project 01/19/00	**Alternative 1**	App. 3 Map I

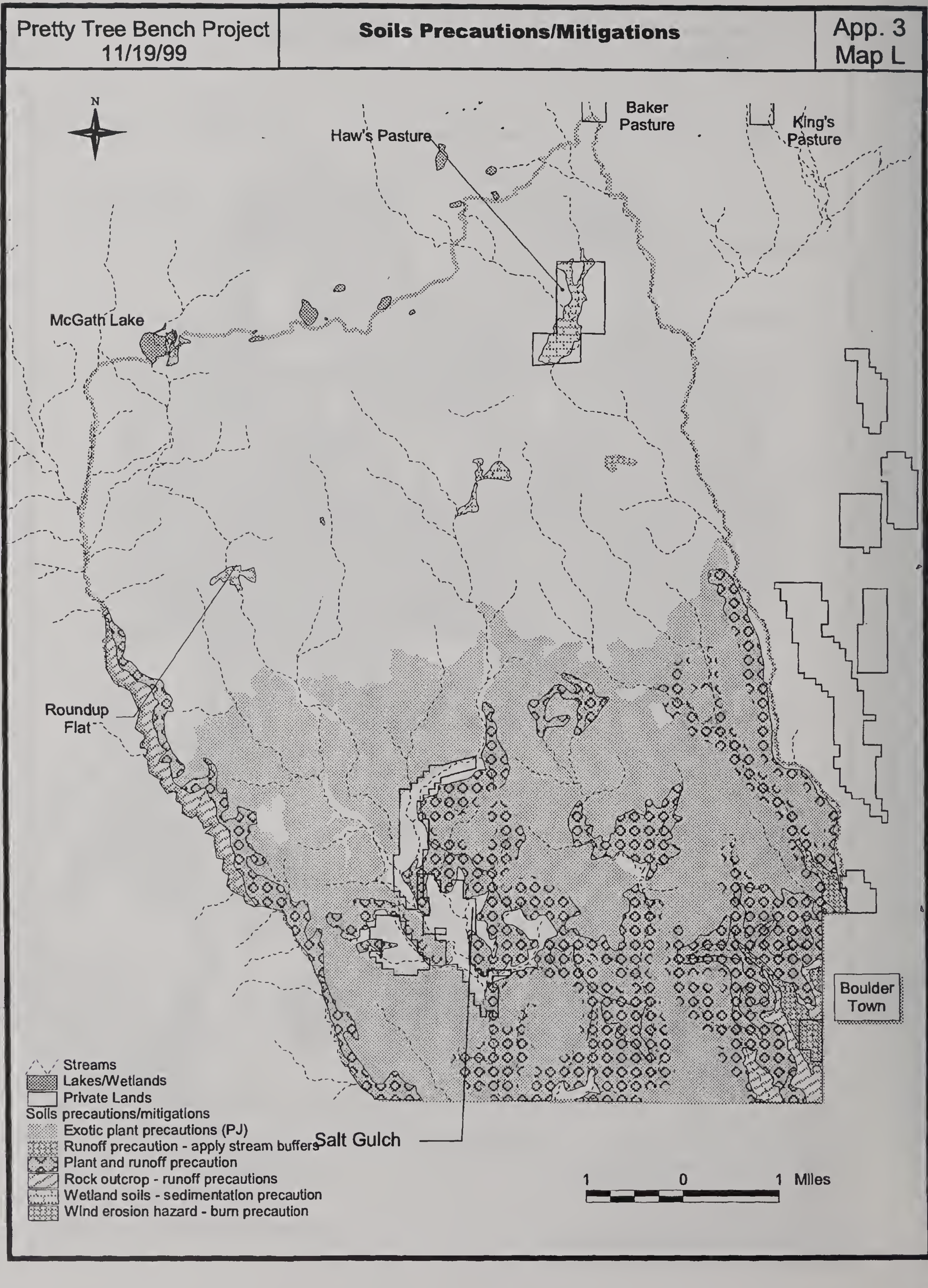




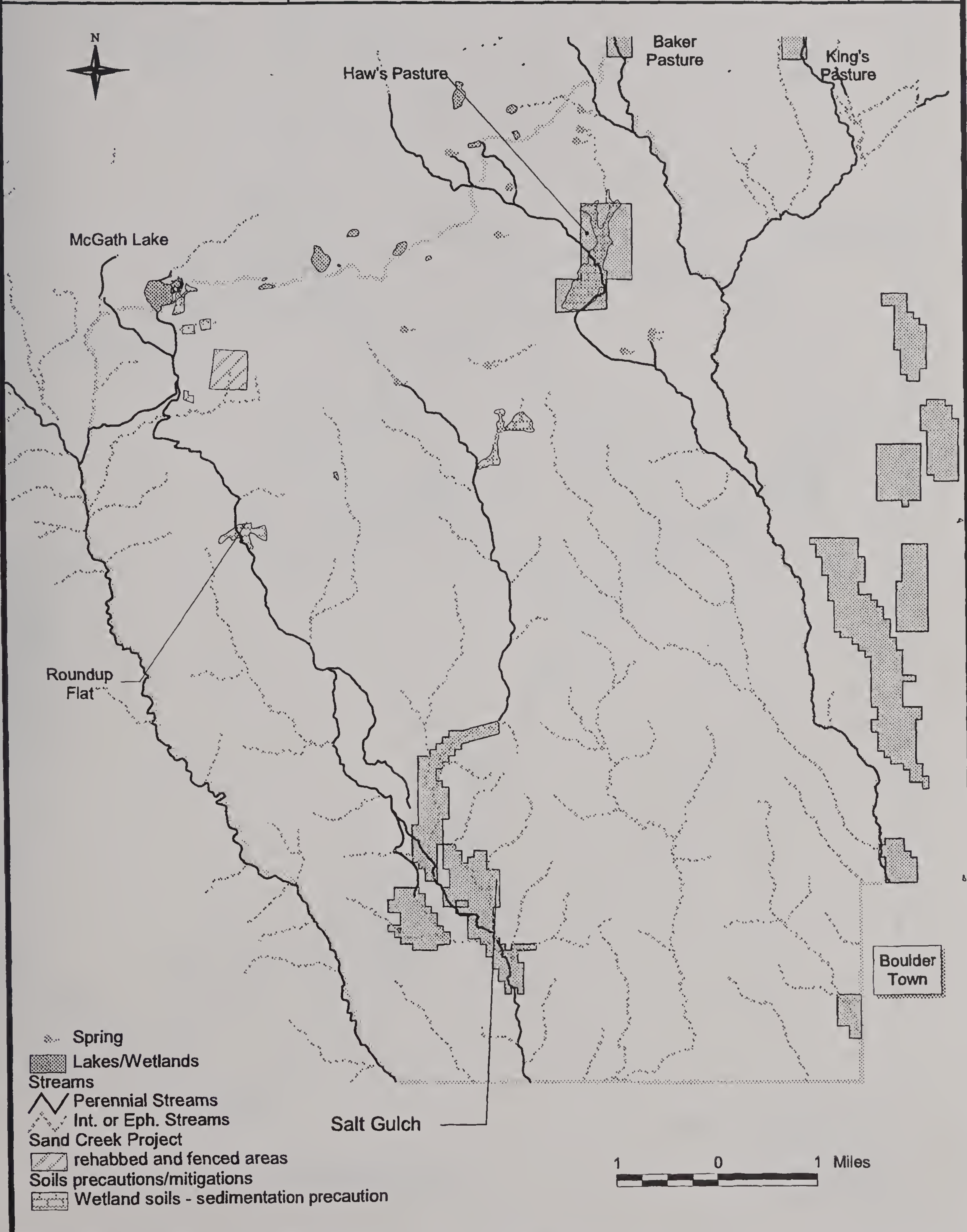
Pretty Tree Bench Project
01/19/00
Alternative 2
App. 3
Map
N
Baker Pasture
King's Pasture
Haw's Pasture
Road Draw
Allotment Fence
OHV Trailhead
To Jacob's Reservoir
McGath Lake
475
566
166
494
720
566
699
153
Roundup Flat
Seasonal Closures for Winter/Spring habitat 8/20-6/01
153
Boulder Town
U12
Gate
Transportation System
Open
Seasonal
OHV
Cattleguard
Disturbance
Oak Burn Areas
Sage Burn Areas
Mixed Conifer Burn Areas
Ponderosa Pine Burn Areas
Pinyon Juniper Treatment Areas
Aspen Maintenance Areas
Aspen Burn Areas
Aspen Cutting Regeneration Areas
Salt Gulch
Hell's Backbone Road
1 0 1 Miles
Roads not shown on map are closed.

Pretty Tree Bench Project 01/19/00	Alternative 3	App. 3 Map K

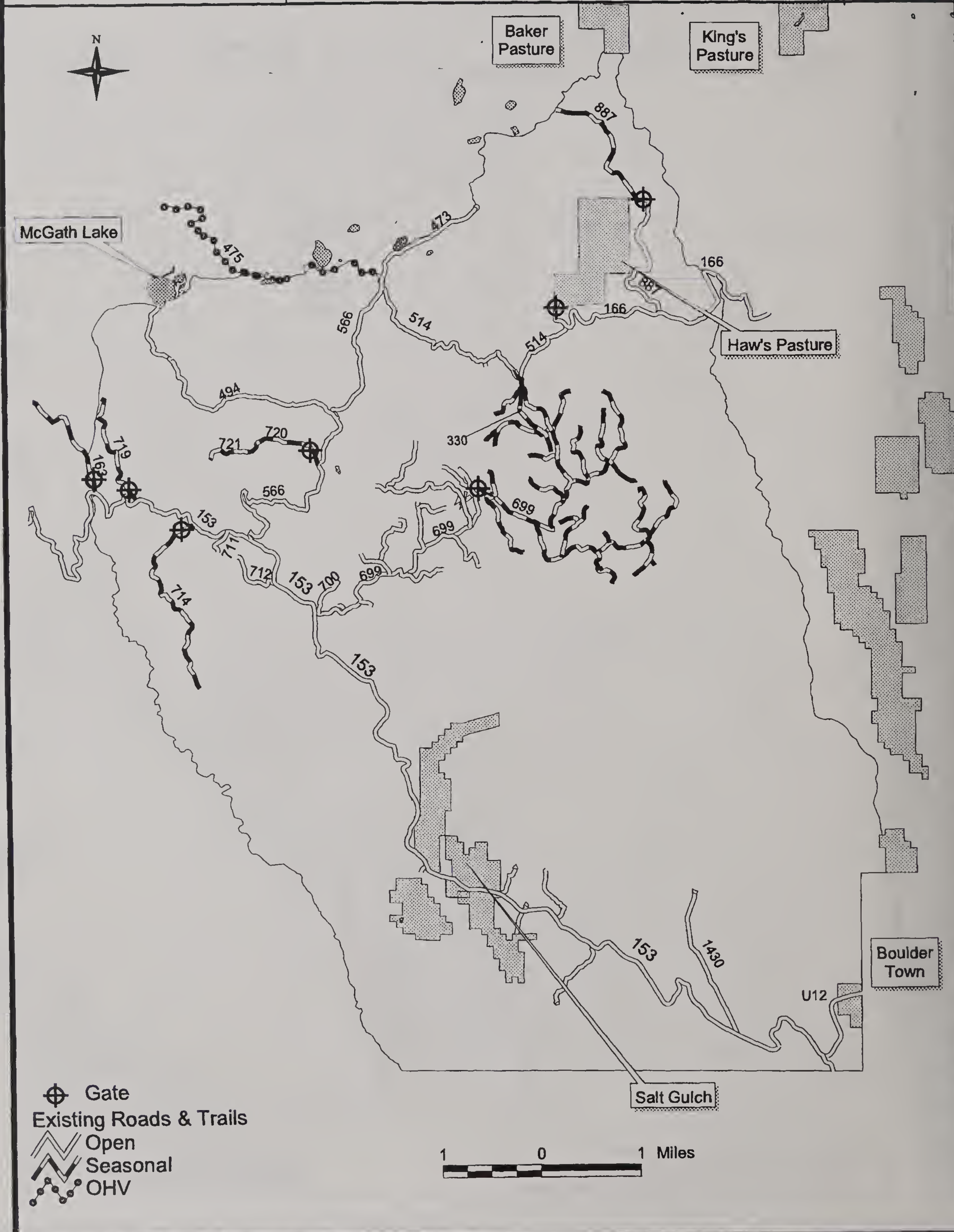



Pretty Tree Bench Project
11/19/99
Soils Precautions/Mitigations
App. 3
Map L
N
Haw's Pasture
Baker Pasture
King's Pasture
McGath Lake
Roundup Flat
Boulder Town
Salt Gulch
Streams
Lakes/Wetlands
Private Lands
Soils precautions/mitigations
Exotic plant precautions (PJ)
Runoff precaution - apply stream buffers
Plant and runoff precaution
Rock outcrop - runoff precautions
Wetland soils - sedimentation precaution
Wind erosion hazard - burn precaution
1
0
1 Miles

Pretty Tree Bench Project 11/19/99	**Watershed Critical Areas**	App. 3 Map M



Pretty Tree Bench Project 11/18/99	**Existing Transportation System**	App. 3 Map N



APPENDIX 4

PRETTY TREE BENCH
DEIS COMMENT RESPONSES
(ID Review 7/16 & 7/19)

Response Key

Letter 1	Stoltze Aspen Mills
Letter 2	Mark Belles
Letter 3	Stoltze Aspen Mills
Letter 4	Utah Environmental Congress
Letter 5	United States Department of Interior, U.S. Fish and Wildlife Service
Letter 6	United States Environmental Protection Agency
Letter 7	Forest Guardians
Letter 8	Southern Utah Wilderness Alliance

Specific comment analysis for Letter 5 (USFWS) and Letter 6 (EPA) have been addressed in detail in Appendix 5.

Project Support

Letter Number	Comment Number	Comment	Response
1	1	"...would like to extend its continuing support to Pretty Tree Bench Vegetation Project."	General project support.
2	1	"I support objective of the project, to establish within the project area the DFC through use of fire."	Supports objectives with fire use.
3	1	"We will continue to support your Forest activity."	General project support.
8	5	"SUWA applauds the Dixie's efforts to protect the forests resources and Watersheds"...	Support for road closures.

Watershed/Hydrology and Soils

Letter Number	Comment Number	Comment	Response
1	2	"The negative statements in 2.2.2. would have the reader believe all harvesting is bad. These opinions expressed in this EIS are not professional or factual and detracts greatly from good intentions."	The comment expresses opinion and offers no new substantive information for consideration.
1	3	"Forest and watershed restoration should be the primary purpose of this project. Vegetation Management Planning and action to enhance water supply should be the first goal."	The purpose and need for the project is described in the FEIS, Chapter 1. The comment expresses opinion and offers no new substantive information for consideration.
8	27	"The DEIS states that the project will not significantly contribute to cumulative watershed resource efforts, DEIS P.4.45. There is no basis for this statement."	Disclosure regarding effects to the watershed are analyzed in the FEIS at Chapter 4. Reference citations relevant to this conclusion are now listed (FEIS 4.2.6.2).

Recreation

Letter Number	Comment Number	Comment	Response
1	4	"...users are forced to this area in greater numbers. This added use had not been addressed.	Disclosure regarding recreation use can be referenced in the DEIS (pg. 3-11, 4-8 & 9, 4-32 & 33, 4-74, 4-100 and 4-127 & 128).

Transportation System/OHV/Road Management

Letter Number	Comment Number	Comment	Response
1	5	The newer preferred vehicle is lighter on the land and also travels over more area in a day. This use was not addressed..."	Prior to issuing a decision on travel management, the disclosure regarding motorized use will be addressed more completely.
2	4	"I see no reference in the purpose and need of the project to address transportation issues such as ORV trails."	Prior to issuing a decision on travel management, the purpose and need will be more clearly described.
2	5	"My preference is the option described in Alternative 2, which maximizes the road closures.	Supports transportation segment of Alternative 2.
2	6	"A detailed analysis of the in-use width of the proposed ORV road is required. The issue is not whether the road is constructed to be 50 inches wide, but rather what will the actual width be?"	Prior to issuing a decision on travel management, the disclosure in the document will more clearly describe agency policy and the OHV trail.
4	19	"The Forest Service fails completely to describe the purpose and need for such an addition to the project stating simply "An OHV trail starting from the Dry Lake Trailhead and looping around Haws Pasture would be provided."	Prior to issuing a decision on travel management, the purpose and need will be more clearly described.
4	20	"Is the OHV trail a part of the proposal contained within the EIS, or has it gone through NEPA separately?"	Prior to issuing a decision on travel management, more clear explanation and disclosure will be included.

4	21	Is the OHV trail already being built, thus the statement that development "would continue" under the no action alternative? If so, why provide the public with the option of eliminating it under alternative 2?"	Prior to issuing a decision on travel management, the trail status will be more clearly explained.
4	22	"If the OHV trail is a part of the Proposed Action, which it is, it seems logical that the No Action Alternative ought to drop the OHV trail as something that would go forward, even if the rest of the proposed action were adapted."	Prior to issuing a decision on travel management, the trail status will be more clearly explained. Dropping the OHV trail will be included in a separate alternative.
4	23	"As such, the Forest Service did not provide any cumulative effects analysis regarding this aspect of the project. The OHV trail was never presented as a part of the larger picture being dealt with in this EIS"	Prior to issuing a decision on travel management, more complete disclosure will be provided.
4	24	"The planning process will analyze and evaluate current and potential impacts arising from operation of specific vehicle types on soil, water, vegetation, fish and wildlife, forest visitors and cultural and historic resources. 36 C.F.R. 295.2(a)"	This regulation actually describes planning requirements at the Forest Plan level, not development level. The Dixie LRMP addressed compatibility. This site specific project describes and discloses implementation affects.
4	25	"This EIS contained no analysis of "impacts arising from operation of specific vehicle types" or any vehicle types for that matter."	Prior to issuing a decision on travel management, the Project File will include the Transportation Analysis as described in agency policy.

4	26	"We call on the Forest Service to drop the OHV trail from the final EIS or include a detailed analysis of the potential impact it will have on the resources within the area as required by law."	Prior to issuing a decision on travel management, effects disclosure will be more clearly described.
8	3	"Thus, the maps fail to inform the public as to which roads the text of the DEIS is referring."	Prior to issuing a decision on travel management, map corrections will be included.
8	4	"The DEIS must be supplemented with a map that depicts all of the various road numbers, so that the public can respond with meaningful comments."	Prior to issuing a decision on travel management, map corrections will be included.
8	6	"Why are any of these ways proposed to be kept open, even if only seasonally? What purpose do these ways serve?"	Prior to issuing a decision on travel management, the project file will include a Transportation Analysis which will describe individual road status and need.
8	7	"What are the impacts to soils, vegetation, wildlife and watershed values resulting from these routes remaining open?"	The effects on these resource values are disclosed in Chapter 4 of the FEIS.
8	8	"Why is the spur route heading west off of Forest Road 566 proposed to remain open?"	Travel Management in this area has previously been decided upon (Sand Creek Soil Stabilization decision). Line officer direction was to maintain the travel decisions that had already been made.
8	9	"What are the expected impacts to the soil, vegetation, wildlife and water quality resulting from this route remaining open?"	Associated impacts were previously disclosed in Chapter 4 of the Sand Creek Soil Stabilization EA.

8	10	"The DEIS fails to analyze the direct, indirect, or cumulative impacts from keeping these routes open."	These impacts are disclosed in the FEIS, Chapter 4, and Appendix 3, Maps H-K. Disclosure is further provided in the previous analysis for the Sand Creek Soil Stabilization decision.
8	11	"What is the purpose of keeping Road Draw road open to 4x4's and OHV's?"	The FEIS analyzes alternatives that will keep it open, or close it. The analysis is found in Chapter 4, and the reason is described in Chapter 2 (Alternatives).
8	12	"What inputs do motorized travel have on the soil, vegetation, wildlife, and water quality of the area? The DEIS fails to analyze the direct, indirect or cumulative impacts from keeping this road open."	The effects on these resource values are disclosed in Chapter 4 of the FEIS.
8	13	"Does the county have historic maintenance record evidence to support this claim? Was this way reserved to the US government at the date the Dixie National Forest was established?"	The Project File includes information submitted by Garfield County. Prior to issuing a decision on travel management, the transportation analysis will be included in the record.
8	14	"The DEIS fails to discuss the purpose and need for the proposed ATV trail."	Prior to issuing a decision on travel management, the purpose and need will be more clearly described.
8	15	"The DEIS further fails to analyze the direct, indirect, or cumulative impacts from constructing and maintaining the proposed OHV trail. Why are more miles of OHV trail needed?"	Prior to issuing a decision on travel management, effects disclosures will be more clearly stated. The Proposed Action reduces miles of open road to 54.88 miles (DEIS at Chapter 4, page 32).
8	16	"Is the OHV trail a separate proposal that has already been decided upon?"	Prior to issuing a decision on travel management, more clear explanation and disclosure will be included.

8	17	"Has the Dixie made the requisite assessments?"	Prior to issuing a decision on travel management, a Transportation Analysis will be completed and become a part of the project file.
8	18	Regarding the monitoring section of the DEIS: "This standard is vague and clearly not adequate."	Prior to issuing a decision on travel management, the monitoring item will be clarified.
8	19	"The DEIS fails to disclose the source of funds that are proposed to be used for the proposed OHV trail. An accurate disclosure of the source of all the funds to be used for the construction maintenance and monitoring of the this proposed trail."	Project implementation will include the use of any legal and appropriate sources including federal, state, county and private contributions. Sources of funding for project implementation are not a part of the decision to be made. Typically this would be funded with trail maintenance, trail construction and partnership money.
8	20	"The Dixie is trying to use a technical loophole in the interim road rule with this proposed OHV trail."	This is not a loophole. Guidelines pursuant to the Interim Road Rule are issued through the Washington Office. These guidelines, as documented in the project file clearly show that OHV trails are not a category suspension of the rule.

GRAZING

Letter Number	Comment Number	Comment	Response
2	2	"I urge the Forest Service to review the grazing allotment levels and determine what level allows the Desired Future Condition to be sustainable without causing the need for future remedial actions."	Grazing levels were assessed in 1995 and are not part of this decision (FEIS 2-2). The project file white paper discusses that conditions are attributable to livestock numbers in the early part of the century. Grazing levels today are much less than grazing levels during the early part of the century.

4	3	"We think this problem would be best solved by removal of livestock and allowing natural fire to burn in the future."	Grazing levels were assessed in 1995 and are not part of this decision. The use of wildland fire is being analyzed under a separate document (FEIS 2-2).
4	10	"Are you going to reduce/remove livestock from the area?"	Through the NFMA process it was determined that this action would not be needed in order to meet project objectives. Grazing levels were assessed in 1995 and permits have been issued until at least 2005. Terms and conditions for grazing permits include written annual grazing plans.
4	4	"Unfortunately the EIS failed to address one of the primary reasons behind the abundance of mature to old growth aspen stands, grazing."	The reason for this condition is actually lack of disturbance. This is disclosed at the DEIS 3-5, 3-45 & 46, 3-48.
4	5	"Livestock is one aspect of the problem that can be directly influenced through reduction in livestock numbers or elimination altogether. By removing this pressure where it exists, the Forest Service may be able to ensure quicker stand recovery after treatments such as the one proposed, or even without them."	These concerns are reflected in the project design. The Project will be implemented at a scale which distributes ungulate effects throughout a large area, thereby reducing potential for concentrated use in specific areas, and assuring aspen regeneration success.
4	12	"The Forest Service should be using the best, most recently available information at its disposal."	Disclosures in the document reflect the use of the best, most recently available information.

8	21	"The DEIS states that without allowing cutting, burning will not restore areas - DEIS at pg. 4-26. How was this determined?	This statement was made specific to the pinyon/juniper vegetation type and discussed work performed by Chong and Bunting (1994), wherein they found that restoring ground cover on PJ sites required a combination of tree thinning and grass seeding. Their work concluded elimination of livestock grazing will not restore areas (DEIS 4-26).
8	22	"The DEIS did not consider the alternative (as SUWA suggested in our previous comments) of reducing/eliminating domestic livestock grazing in these acres and allowing the natural fire regime to exist."	The DEIS does in fact consider this alternative. It can be referenced in Chapter 2, page 2.
8	23	"Merely because the Dixie's LRMP allows grazing on various forest lands does not automatically allow USFS to allow such grazing to degrade the forest's resources. The USFS has responsibility to manage this grazing to prevent degradation of the forest resources."	The decision and assessment regarding the grazing of livestock was made in 1995. Re-analysis of this decision (which is less than 5 years old), is not part of this proposal.

FIRE AND FIRE SUPPRESSION

Letter Number	Comment Number	Comment	Response
2 4	3 8	Both of these comments expressed the thought that following the actions described in the Pretty Tree Bench Vegetation Project, the Dixie National Forest should establish policies so that the existing conditions won't occur again in the future.	Land management will always include future management proposals. There are no additional site specific projects proposed at this time. Future proposals will be driven by desired future conditions and landscape goals described in the Forest Plan. Landscape assessments, when compared to these Forest Plan goals will then result in any further future needs and proposals.
8	24	"If the United State Forest Service is considering allowing natural fire to burn in areas of the Dixie, why is the current project being proposed at this time?"	The Properly Functioning Condition assessment showed large vegetation structural imbalance across many different vegetation types within the concentrated area. Because of the need to change structure, and efficiencies with working in a concentrated area, this project was selected. Stand structure risks associated with natural fire make this practice less desirable then using managed fire so that vegetation characteristics like old growth will remain.
4	9	"Are you going to allow naturally occurring fires to burn, provided they don't threaten public safety or private property?"	Analysis for this project, the Eastside Wildland Fire Plan, is currently underway. This is disclosed in the DEIS 2-2.

NATIVE SEED

Letter Number	Comment Number	Comment	Response
2 8	7 29	Both of these comments expressed the preference to use native seed for ground cover establishment.	This option is provided for in Alternative 2 (FEIS Chapter 2).
8	28	"How will it be determined when non-natives should be used for erosion and big game?"	The criteria for use of non-native seed is the use on "non-intrusive" stock as disclosed in the DEIS, Chapter 2, page 9 (2.4.1.7). Further description for use of non-native seed is found in the project file "Determination for Seeding and for Using Non-Native Seed on Burn Areas." This paper provides guidance for slope, size and soil type.

ROADLESS/UNDEVELOPED

Letter Number	Comment Number	Comment	Response
4 8	1 2	Both comments expressed concern for moving more than 30% of the roadless/undeveloped acres to a developed character for the short term and long term.	The loss is not permanent. Mitigation has now been input into the design so that the long term loss of roadless, will be less than one fourth of one percent within the Cumulative Effects Area and less than 3% within the analysis area. This is now part of the FEIS.
4	2	"The UEC urges the Forest Service to drop any lands within roadless areas from the project."	This option is provided for in the alternatives (FEIS, Chapter 2, No Action).

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4	9	"Are you going to allow naturally occurring fires to burn, provided they don't threaten public safety or private property?"	Analysis for this project, the East-side Wildland Fire Plan, is currently underway. This is disclosed in the DEIS 2-2.

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4	2	"The UEC urges the Forest Service to drop any lands within roadless areas from the project."	This option is provided for in the alternatives (FEIS, Chapter 2, No Action).

8	1	"The comment suggested that roadless contribution to ecosystem health had not been assessed and therefore effects could not be appropriately determined.	The contribution that roadless plays in regard to ecosystem health has been incorporated into the landscape level Properly Functioning Condition assessment. An assessment also took place at the plan level (DNF, Forest Plan). Impacts to roadless have been disclosed in Section - 4.2.3.1, 4.3.3.1, and 4.4.3.1.
8	2	"... the estimates in the DEIS are likely much too optimistic for this area. That the proposed action would radically change over 30% of the roadless/undeveloped area for a minimum of 10-15 years is unacceptable."	The FEIS provides disclosure relative to roadless. (FEIS Chapter 4). The Proposed Action is consistent with the Dixie LRMP, and follows all law, policy and regulation. This project will effect less than 1/4 of 1% of the roadless/undeveloped acres within the Cumulative Effects Area, and less than 3% within the analysis area.

OLD GROWTH

Letter Number	Comment Number	Comment	Response
4	6	"The value of mature trees, snags and cover provided by old growth are not adequately addressed in the EIS, and the justifications offered for this aspect of the proposed action are inadequate."	The DEIS and FEIS describes completely old growth and associated characteristics (DEIS at 3-8 through 11, 3-14, 3-29 through 32, 3-35 through 37 and 4-14, 15). Treatment priorities are determined through the PFC assessment completed during landscape analysis located in the project record. The action and all alternatives are in compliance with the LRMP old growth standards and guidelines, which provides for protection of old growth values.

8	25	"DEIS states too much old growth, based on what standard."	Structural stages analysis were a part of the PFC assessment. This determined structural mixes that are needed for ecosystem health as described in the Properly Functioning condition report, located in the project file.
8	26	"The DEIS fails to adequately address the value that old growth areas contribute to overall forest health."	The contribution that old growth makes to ecosystem health has been incorporated into the landscape level Properly Functioning condition assessment. A broadscale assessment also was made at the plan level (DNF, Forest Plan). Impacts to old growth have been disclosed (DEIS 4-5, 4-29, 4-73, 4-99, 4-100, 4-124).

TIMBER

Letter Number	Comment Number	Comment	Response
4	7	"I suspect the Forest Service would say future even aged management harvest would be "outside the scope of this project" as well regardless of the fact that together it is one of the primary reasons the Forest Service is considering this project in the first place."	Any future management proposals will be analyzed and disclosed in site specific NEPA documents. The Proposed Action does include even aged management actions as disclosed in the DEIS 2-3, 2-5 and 2-7. Even aged management is a legitimate practice that is available for use in meeting objectives.
4	11	"Are you going to end even aged management on this portion of the Dixie?"	No. Even aged management continues to be a legitimate practice available for meeting land management objectives.

7	1	"We prefer any management of aspen stands be conducted with natural processes such as fire."	This concern is reflected in the DEIS at Page 2-2. The Eastside Wildland Fire Plan is currently being analyzed, and it will determine the appropriate role of wildland (natural) fire and its use. Alternative 1 excludes the harvest of aspen.
7	2	"Further, clearcutting aspen disregards late-successional stands as well as stable aspen stands and the wildlife dependent upon these stands."	Effects of aspen clearcutting are disclosed as consequences in the DEIS, Chapter 4, pgs 4-14 through 4-20, 4-46 through 4-58, 4-84 through 4-87, 4-110 through 4-113, and 4-136 through 4-139. (for wildlife), and (for vegetation), pgs 4-2, 4-26, 4-27, 4-68, 4-69, 4-94, 4-95, 4-122.

WILDLIFE

Letter Number	Comment Number	Comment	Response
4	13	This comment expressed concern and the feeling that the Forest Service did not recognize old growth value.	Old growth has been clearly recognized in the design and analysis. DEIS at Chapter 3 pg 3-10. DEIS Chapter 4 pgs 4-5, 4-14, 4-15, 4-29, 4-31, 4-46, 4-47, 4-56, 4-73, 4-74, 4-84, 4-97, 4-99, 4-110, 4-124, 4-127, 4-136.
4 4	14 15	These two comments questioned why an action would be proposed which jeopardized suitable goshawk habitat. Especially since the species had been petitioned for listing.	The USFWS has determined three previous times, that listing of the northern goshawk is not warranted. The Biological Evaluation assessed effects to goshawk habitat, and concluded the actions would not adversely impact any sensitive species.

4	16	"In addition, the EIS totally ignored possible .impacts to two sensitive bat species."	Effects are disclosed in the DEIS at 4-53. Additionally, the project BE, located in the project file discloses effects to spotted bats and western big-eared bats. The BE concluded action would not adversely impact sensitive species nor result in a loss of viability.
4 4	17 18	These two comments questioned how the conclusion could be reached without monitoring data.."	Conclusions are based in part on the information disclosure discussed in the Life Histories paper (project file). Conclusions are also documented in the BE located in the project file.

ECONOMICS

Letter Number	Comment Number	Comment	
4	27	"It is noteworthy that the cost of developing the OHV trail is not included.."	Costs have been updated to reflect trail construction. Economics analysis information is disclosed at 4-23, 4-61, 4-89, and 4-116.
4	28	"We ask that at the very least it ask for a minimum of $73,356.26 for the timber being sold."	Advertised rates for timber are set by USFS appraisal policy (Ref, FSH 2409.18). The DEIS discloses (pg. 4-61) the proposed action will return at least $53,000.
7	3	"We are concerned with the adverse economic effects of the National Forest logging program...or for the program as a whole."	This project level analysis meets the NEPA obligation of disclosing economic effects. These are found at the DEIS 4-23, 4-61, 4-89 and 4-116. Cost/benefit analysis have also been completed for each alternative.
7	4	"The ecosystem service values of standing or otherwise intact forest ecosystems...are systematically undervalued or not valued at all."	Values such as these are represented and covered in RPA assessments. They are not a necessary disclosure component at this decision level.

7 7	5 6	These comments related to using latest quantitative techniques and economists to develop the economic analysis.	The DEIS (Pg. 4-23, 4-61, 4-89, 4-116 and 4-141), has disclosed the economic effects of the proposal. This analysis is complete and useful, and represents one of several factors that the decision maker will consider. Cost is important, a healthy ecosystem is important and providing winter range for wildlife and reducing destructive wildfire risk is also important.

GENERAL NEPA

Letter Number	Comment Number	Comment	
7	7	"We specifically request consideration of an alternative....without completing the commercial sale component."	This alternative has already been analyzed within the FEIS. Alternative 1, Chapter 2 has no commercial component.
8	30	"Please consider a more natural management strategy....reducing domestic livestock grazing when impacts are observed."	The DEIS and FEIS at Chapter 2, page 2 discusses this alternative.
2	8	"I believe that a timetable with measurable goals for improvement of areas not meeting the Desired Future Condition should be established. If these goals are not met, further analysis or other actions should be taken to return the improving trend of the forest conditions to the planned trajectory."	The FEIS prescribes monitoring measures in Appendix A-1. These include aspen regeneration (Appendix 1 pg. 1), (Appendix 1 pg. 4); maintenance of pure aspen (Appendix 1 pg. 5); ponderosa pine (Appendix 1 pg. 6); P/J (Appendix 1, pg. 7); sagebrush (Appendix 1, pg. 8); ground cover and big game forage (Appendix 1, pg. 14); fuel and fire hazard reduction (Appendix 1, pg. 15).

PRETTY TREE BENCH

Comments Received After the July 6, 1999 review period.

Analysis completed 8/19/99

Letter	Name	Letter	Name
1	Amy L. Shima	25	Jim Steitz
2	Janet Allen	26	Nancy Newson
3	Jason Rabb	27	Dr. Samuel R. Rushforth
4	Caroline M. Bodkin	28	Andre Lestage
5	Megan Ryan	29	Jan Allison
6	Marilyn Dinger	30	Jennifer Guetschow
7	Ray Gromer	31	Dan Brendle
8	David A. Lier	32	John Long
9	Dylan Norton	33	Brian Hawthorne
10	Toni Wall	34	Alan Peterson
11	Patrick Diehl/Victoria Woodard	35	Robert Norton
12	Joe Ginsburg	36	Tom Badlong (info)
13	Mark M. Criese	37	William McCarvill (info)
14	Marcus Simon	38	Stephen McKague
15	Faye Coates	39	Dan Thomas
16	Teresa & Dallas Rex	40	Will Smith
17	Ms. Robin Hampton	41	Stephen Canning
18	Mr. & Mrs. Truman E. Lynch	42	Tristan Matz
19	Jami Rodebaugh	43	Myron Carter
20	Chris Carlson	44	Lone Peak 4 Wheelers
21	Nils Larsen	45	Peg Resband
22	Molly Miller	Call 1	Patricia Murphy
23	Alice Whitlock	Call 2	Craig Axeford (UEC)
24	Mr. Kim John	Call 3	Brian Hawthorne (Utah Shared Access Alliance)

After the July 6, 1999 DEIS review period; forty eight responses were received. None of these responses led to new issues or new alternatives to the Proposed Action.

One telephone response supported the proposal.

Two responses were telephone calls and two letters were asking for information.

Two responses supported the proposal.

One petition was sent (17 signatures) supporting the proposal

The remaining responses offered statements of opinion, or discussed issues that have already been addressed in the DEIS or previous comment response.

APPENDIX 5

USFWS AND EPA DEIS COMMENT RESPONSE

Detailed response to USDI, U.S. Fish and Wildlife Service comments to the Pretty Tree Bench Vegetation Project, DEIS.

USFWS comment regarding the "Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances." The FWS recommends that these Guidelines be implemented for vegetation projects which can impact nest sites (e.g. tree harvest, burn).

Response: The Pretty Tree Bench Vegetation Project will consider the guidelines as described in the publication. They have been discussed and the paper is included in the project file.

USFWS comment regarding; adhering to conditions detailed in the Species Conservation Plan for the Aquarius paintbrush plant.

Response: Specifics associated with the candidate species, Aquarius paintbrush, have been disclosed within the Biological Evaluation. The project will have no detrimental effect on this species.

Detailed response to comments from the United States Environmental Protection Agency (EPA), to the Pretty Tree Bench Vegetation Project, DEIS.

Comment 1: The EPA discussed some of the project attributes as being selective commercial cutting of trees, and the 302 acres of aspen be cut commercially to promote stand regeneration, plus 40 acres of aspen would receive non-commercial cut.

Response: These statements have not been interpreted correctly from the Proposed Action. The harvest methods will be clear-cut and patch cut methods, not selective cuts. Also, the 40 acre reference indicates the maximum size of any single harvest unit, not 40 acres of aspen non-commercial cut.

Comment 2: "...These measures should adequately protect water quality from potential water quality impairments."

Response: Project design agreement is acknowledged.

Comment 3: "We are unable to find any discussion or information related to potential impacts to wetlands."

Response: Discussion on wetlands has been added to the FEIS. This can be referenced in Chapters 3 and 4, and on the map (Appendix A-3).

Comment 4: "We encourage the Forest Service to delineate and mark perennial seeps, springs, and wetlands on maps and on the ground before harvesting and burning activities take place.

Response: A critical watershed map has been included in the project record. Activities as implemented, will follow the measures as noted in comment #2, above.

Comment 5: "We are unable to find a Sediment Reduction Plan related to road closures....."

Response: The sediment reduction plan has been included in the project record.

Comment 6: "The abstract states that under the Proposed Action, "No road construction or reconstruction will occur." Page 66, Section 4.2.15.1 states, "The effects of implementing the Proposed Action on travel management would be the results of road reconstruction, the amount of roads remaining open to motorized travel and ...." These statements seem to be in conflict.

Response: Road construction within the abstract has been deleted from the FEIS.

Comment 7: "We recommend the FEIS discuss in greater detail the stabilization measures proposed by the Sand Creek Stabilization Project NEPA analysis and their monitored success to date."

Response: Discussion regarding past and future actions for stabilization has been added to the FEIS.

Comment 7(a): "Page 38, Section 4.2.4.3. Recommend that the title to this section be changed to "Other Effects Analysis Required by CEQ Regulations."

Response: This change has been made to the FEIS.

Comment 8: "Recommend that a statement be included in the FEIS to the effect that streams in the project area are not presently listed on the State of Utah 303d List as water quality impaired, and that additional impacts from the Proposed Action would not require any TMDL listing for sediment.

Response: Discussion regarding the 303d list for the State of Utah has been added to the FEIS.

Comment 9: "Recommend that "in clean air" be changed to "in the Clean Air Act"."

Response: This change has been made to the FEIS.

Comment 10: "Recommend that this section discuss trend in visibility improvement/impairment for the three Class I areas: Bryce Canyon, Grand Canyon and Canyonlands National Park."

Response: Discussion regarding visibility trends within the Class I areas stated, have been added to the FEIS.

Comment 11: "Recommend that this section present a windrose that would be representative of the project area."

Response: This section of the FEIS now discusses prevailing windrose and wind pattern direction. These charts are found within the project record.

Comment 12: "As stated under PSD, there are no Class I Airsheds within 5 miles of the project area. Recommend that this sentences be changed. This sentence could state that

there are no Class I areas within 10 kilometers (approximately 6 miles) of the project area."

Response: The comment has been noted. The measurement guide the USFS uses for this disclosure is the 5 mile guide.

Comment 13: "When mitigation wouldn't contradict with any mitigation measures." Please discuss which mitigation measures are being discussed. In addition, this section should state what specific steps the Forest Service will take to minimize air quality impacts due to prescribed burning such as, not burning during periods of inversions or high winds, etc.

Response: Discussion regarding mitigation measures application has been included in the FEIS. Specific steps and their application to minimizing air quality impacts are located in the project record.

Comment 14: "These effects would be spread out over an 8 five year period.... ." Recommend that the 8 be deleted from the above sentence.

Response: The "8" will be deleted in the FEIS.

Comment 15: "Recommend that the phrase "State Requirements" be delineated in the section. i.e. which state requirements will not be exceeded?"

Response: The word requirement has been deleted from the FEIS. Smoke management guidelines (SMG's) have been listed specifically.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
P.O. Box 25007 (D-108)
Denver, Colorado 80225-0007

RECEIVED
ESCALANTE R.D.
JUN 30 '99

June 28, 1999

ER 99/414

Mr. Kevin Schulkoski
District Ranger
Escalante Ranger District
P.O. Box 246
Escalante, Utah 84726

Dear Mr. Schulkoski:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) for the Pretty Tree Bench Vegetation Project, Dixie National Forest and has the following comments.

The U.S. Fish and Wildlife Service (FWS) previously provided comments (February 11, 1998) on this project in response to a scoping letter. In general, the DEIS responds to their concerns. However, the Forest Service should further consider the following during preparation of the Final EIS:

1. Sections 2.4.1.3 and 2.4.1.6: The Draft EIS states that protection will be provided of all active raptor nests found during management activities. There is also the stipulation that monitoring will be conducted to determine the occupancy of all known goshawk nests. Burning within the vicinity of goshawk nests will be postponed until after the nesting season, until nest sites are determined to be nonproductive, or until treatment can proceed without adverse impact to fledging success.

   The FWS appreciates incorporation of raptor protection stipulations into project planning. However, the stipulations presented in the DEIS only apply to active nests. In addition, protection of goshawk nests is limited to known nests.

   The FWS has developed the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Guidelines; Romin and Muck, May 1999). These guidelines recommend preproject surveys for nests of all raptor species. In addition, protection of both occupied and unoccupied nests is important because not all raptor pairs breed every

year or utilize the same individual nest within a nesting territory. Individual raptor nests left unused for a number of years are frequently preoccupied. The Guidelines recommend nest and winter roost buffers for each species of raptor in the State based on the type and duration of land use activity.

The FWS recommends that these Guidelines be implemented for vegetation projects which can impact nest sites, such as tree harvest or burn treatments. If you have not been provided with a copy of the Guidelines, please contact the Ecological Services Field Office, 145 East 1300 South, Suite 404, Salt Lake City, Utah 84115 (801-524-5009).

2. Populations of the Aquarius paintbrush (*Castilleja aquariensis*), a candidate species, may occur in the vicinity of project activities. Adherence to conditions detailed in the species' Conservation Plan should occur to ensure preservation of existing populations.

Sincerely,

Robert F. Stewart

Robert F. Stewart
Regional Environmental Officer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18^{TH} STREET - SUITE 500
DENVER, CO 80202-2466
http://www.epa.gov/region08

RECEIVED
ESCALANTE R.D.
JUL 12 '99

JUL 1 1999

Ref: 8EPR-EP

Kevin Schulkoski, District Ranger
Dixie National Forest
Escalante Ranger District
P.O. Box 84726
Escalante, Utah 84726

Re: Pretty Tree Bench Vegetation Project
Dixie National Forest, Escalante Ranger
District, Garfield County, Utah
Draft Environmental Impact Statement

Dear Mr. Schulkoski:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and section 309 of the Clean Air Act, the Region VIII office of the Environmental Protection Agency (EPA) has reviewed the referenced Draft Environmental Impact Statement (DEIS). We offer the following comments and concerns for your consideration in preparation of the Final Environmental Impact Statement (FEIS).

We understand that the Proposed Action and the actions alternatives considered in detail will result in the use of prescribed fire and selective commercial and non-commercial cutting of trees. The Proposed Action will use prescribed fire in various parts of the Project area, which is approximately 33,929 acres, to treat the following acres of vegetation types: Sagebrush (200-250 acres), Gamble Oak (450-500 acres), Pinyon/Juniper (3000-3500 acres), Ponderosa Pine underburn (7000 acres), Mixed Conifer underburn (300-350 acres), and Aspen regeneration burn (700 acres). In addition, the Pinyon/Juniper acres would be cut and scattered prior to burning, 1000 acres of understory conifer would be cut for Aspen maintenance, 302 acres of Aspen, to promote stand regeneration, would be offered for commercial harvest, plus 40 acres of Aspen would receive non-commercial cut.

We note that no harvest activities are proposed within one hundred feet of the edge of perennial streams and that no timber harvest would be done in riparian areas. In addition, burning within riparian areas would be limited to 1/4 mile of continuous burning on both sides of a stream. In general, these measures should adequately protect water quality from potential water quality impairments.

AIR QUALITY

Page 51, Section 3.12.1.1, second paragraph, "...as good as or better than, the National Ambient Air Quality Standard (NAAQS) defined in the clean air." Recommend that "in the clean air" be changed to "in the Clean Air Act."

Page 51, Section 3.12.1.3 Visibility. Recommend that this section discuss trends in visibility improvement/impairment for the three Class I areas: Bryce Canyon, Grand Canyon and Canyonlands National Parks. From 1988 through 1995, there has been a trend for a general improvement in visibility for Bryce Canyon and Canyonlands National Parks. However, for the Grand Canyon National Park, there has been a trend towards increasing visibility impairment. Reference: EPA Document 454/R-97-013, "National Air Quality and Emissions Trends Report, 1996".

Page 51, Section 3.12.1.5 Proximity to Private Subdivisions or Class I Airsheds. Recommend that this section present a windrose that would be representative of the project area. This information would be useful for any nearby private subdivisions or residences.

"As stated under PSD, there are no Class I Airsheds within 5 miles of the project area." Recommend that this sentence be changed. This sentence could state that there are no Class I areas within 10 kilometers (approximately 6 miles) of the project area.

Page 63, Sections 4.2.12.1.2.3 and 4.5 "...When implementation wouldn't contradict with any mitigation measures." Please discuss which mitigation measures are being discussed. In addition, this section should state what specific steps the Forest Service will take to minimize air quality impacts due to prescribed burning such as, not burning during periods of inversions or high winds, etc.

Page 64, Section 4.2.12.1.5 Visibility. "These effects would be spread out over a 8 five year period... ." Recommend that the 8 be deleted from the above sentence.

Page 65, Section 4.2.12.2 Cumulative Effects of Proposed Action. Recommend that the phrase "State Requirements" be delineated in the section. i.e. Which state requirements will not be exceeded?

RECORD OF DECISION FOR PRESCRIBED FIRE TREATMENTS IN THE PRETTY TREE BENCH AREA

based on the

FINAL ENVIRONMENTAL IMPACT STATEMENT

for the

PRETTY TREE BENCH VEGETATION PROJECT

Escalante Ranger District
USDA Forest Service
Dixie National Forest
Garfield County Utah

I. INTRODUCTION

The Pretty Tree Bench Project Area lacks age and structural diversity, due in part to the absence of disturbance phenomena such as fire. The purpose of the Pretty Tree Bench Vegetation Project is to lessen the occurrence of unnatural, high intensity fires; create healthier vegetation conditions (such as greater age and structural diversity, and reduced stand densities); enhance elk and deer winter range; and reduce ground and ladder fuels.

The Proposed Action includes harvest, prescribed fire, and travel management, including OHV trail construction. This decision is for use of prescribed fire to achieve desired vegetative conditions. A separate decision will be made for travel management and OHV trail construction after a Supplement to the Final Environmental Impact Statement (FEIS) is released for review and comment. I will also issue a separate decision on the aspen regeneration harvest and aspen maintenance actions analyzed in the FEIS.

Proposed prescribed fire (management ignition) actions are:

- Burning 200-250 acres of sagebrush. Preparation for this burn will include some cutting of scattered pinyon/juniper to create more fuel to carry fire.
- Burning 450-500 acres of Gambel oak, followed by a second burn in 3 to 5 years if fuel loads exceed 7 tons per acre.
- Burning 3000-3500 acres of pinyon/juniper. Preparation for this burn would include cutting some pinyon/juniper to create sufficient ground fuels to sustain fire.
- Underburning about 7000 acres of ponderosa pine, followed by a second underburn in 3 to 5 years.
- Underburning 300-350 acres of mixed conifer, followed by a second underburn in 3 to 5 years
- Burning and regenerating 700 acres of aspen. Preparation for this burn would include cutting some conifer understory to provide enough fuels to meet burn objectives.

The project area is located in Garfield County, Utah, about 7 miles northwest of Boulder, Utah. Implementation of these actions could begin as early as April, 2000. The project would be implemented over 1 to 8 years, depending on funding and burning conditions.

The Draft Environmental Impact Statement for the Pretty Tree Bench Vegetation Project (DEIS) was released for public comment on May 21, 1999. The comment period closed July 6, 1999.

II. THE DECISION

A. Selected Alternative

The Pretty Tree Bench Project proposal has three primary components: aspen harvest, prescribed fire, and travel management. The project components are independent of each other, can proceed independently, and are not interdependent parts or components of a larger action. I will issue separate decisions for each of the project components. This decision is for the use of prescribed fire to meet desired vegetative conditions.

I have reviewed the FEIS and thoroughly studied the effects of the Proposed Action and alternatives to that action. I have also reviewed the results of public involvement. I have visited the project area with members of the interdisciplinary team. After deliberation and discussion with the interdisciplinary team, the District Ranger, and members of my staff, I have decided to implement the Proposed Action as described in the FEIS for the use of prescribed fire in the sagebrush, Gambel oak, pinyon/juniper, ponderosa pine, mixed conifer, and aspen communities.

I have also decided to emphasize the use of native seed where seeding is needed to restore disturbed areas. Non-native seed will be used only where rapid growth is needed for erosion control, or where enhancement of big game forage is desired. Actions will be implemented as described in Chapter Two, pages 3-4 of the FEIS.

B. Mitigation

In addition to the standards and guidelines in the Dixie National Forest Land and Resource Management Plan (LRMP), project-specific mitigation measures described in the FEIS, Chapter Two, pages 9-13 will be implemented as part of this decision. Site-specific mitigation measures provide for the protection of wildlife and wildlife habitat, soil and water quality, and important visual, recreation, cultural, and roadless/undeveloped resources. Many of the mitigation requirements will be implemented as part of the Prescribed Fire Burn Plan. The remaining mitigation measures will be completed during project design and implementation.

C. Monitoring and Evaluation

Activities associated with this portion of the Proposed Action will be monitored as described in Appendix A.1 of the FEIS.

III. REASONS FOR THE DECISION

My decision to select the prescribed fire actions in the Pretty Tree Bench Project Area is based on the following factors:

- The Purpose and Need in the FEIS provide a strong basis for action. These actions will contribute to site-specific objectives, and move vegetation conditions toward desired future conditions described

in the LRMP. Use of prescribed fire is an appropriate way to meet these objectives and create needed vegetation conditions. Restoration of fire as an ecological process is essential for the continued viability of ecosystem components. In the vegetation types analyzed in the FEIS, long-term health and resilience depends on fire at appropriate intervals, intensities, and season.

- Benefits to wildlife and wildlife habitat are documented in the FEIS, and another reason for implementing the prescribed fire actions. All vegetative communities analyzed provide a variety of benefits to many wildlife species. Implementation of the Proposed Action will contribute to proper functioning condition of habitats on the larger landscape, which in turn helps maintain a diversity of wildlife and plant species.

- Changes in vegetation composition and associated higher densities are increasing the risk of unnatural, high intensity fires. Implementation of the proposed treatments will lower stand densities, increase aspen, reduce shade-tolerant species, introduce fire as a disturbance, and provide for distribution of younger age classes across the landscape.

- These actions can be taken without any new road construction or reconstruction.

- These actions will not affect inventoried roadless areas or, in the long-term, the character of undeveloped/unroaded areas.

- There is a compelling reason to establish aspen seedlings and for maintaining aspen communities within the project area. The landscape analysis completed as part of the Properly Functioning Condition Assessment shows that the long term presence of aspen communities is threatened because of an inadequate number aspen seedlings. To maintain aspen on the landscape, aspen seedlings must be established, and conifer succession, which is threatening the perpetuation of aspen, must be set back.

- The risk of unnatural, high intensity wildfire is too high. By burning areas under controlled conditions, the susceptibility of the project area to large scale wildfires will be greatly reduced, and a more manageable wildland fire condition established.

In this decisionmaking process, I relied upon the alternative analysis (including the no-action alter native) completed by the Interdisciplinary Team and documented in the FEIS. Selection of the prescribed burning component of the Proposed Action is based on the following considerations:

A. Responsiveness to the issues.
B. Responsiveness to environmental quality and the purpose and need.
C. Economic efficiency.
D. Consistency with the agency mission and the Natural Resource Agenda.
E. Reasons for multiple decisions.

A. Responsiveness to the Issues

Public involvement and scoping for the Pretty Tree Bench Vegetation Project has been extensive. Comments received during scoping were used to identify issues and develop alternatives to address them. Following is a brief discussion of the issues identified during scoping that relate to use of prescribed fire. A complete list of issues can be found on page 7 (Chapter 1) of the FEIS.

ISSUE 1: Use of timber harvest as a method for achieving age-class and structural diversity.

This issue relates to proposed commercial timber harvest and the application of management ignited prescribed fire. Two opposing vegetation management concerns are included in this issue. First, there is a concern that commercial timber harvest is an activity that will adversely affect recreational opportunities, ecological processes, and indigenous wildlife and its habitat; and accelerate erosional processes. The second is a concern that the use of management-ignited prescribed fire will consume commercial growing stock (commercial trees) on lands identified as suitable for timber management activities, thereby reducing the availability of commercial timber volume to purchasers.

The consequences of commercial timber harvest and management ignited prescribed fire are analyzed in Chapter Four of the FEIS and in documentation in the Project Record. During alternative formulation, road construction and construction standards were analyzed by the Interdisciplinary Team to determine feasibility of commercial harvest activities in aspen. The need to cross several small streams, which are characteristic of this landscape, requires increasing the standard of road construction to a high level. For this reason, and to comply with the Interim Roads Rule (36 CFR 212), I have decided that prescribed fire is a more appropriate treatment method. Implementation of the prescribed fire activities would move current condition of the vegetation resources toward desired conditions The number of acres treated with management ignited fire (between 11,650 and 12,300) will reestablish fire as a landscape scale disturbance process.

The number of acres of management prescribed fire included in the action alternatives varies in the aspen burn and aspen maintenance components by avoiding the non-commercial cutting of understory conifers in the undeveloped area northeast of Road Draw. The Forest is committed to restoring the role of fire as a landscape disturbance and to reducing hazardous fuel profiles. Monitoring is planned to ensure effectiveness and to identify trends in ecological recovery from disturbance.

I believe application of prescribed fire at a landscape scale within the Pretty Tree Bench Project Area will provide sufficient levels of desirable ecosystem alteration to redistribute age classes, increase structural diversity, reduce stand densities, reduce ground and ladder fuels accumulations, and increase the resiliency of the ponderosa pine and mixed conifer communities to stand-replacing fires.

ISSUE 2: Maintaining an undeveloped character within mapped RARE II areas, roadless inventory areas of 1983/1984, and roadless inventory areas of 1997.

This issue relates to the consequences of management actions on the quality and quantity of undeveloped character within mapped RARE II areas, roadless inventory areas of 1983/1984, and roadless inventory areas of 1997 (specific to the Pretty Tree Bench Project Area). The consequences of management activities on the character of roadless/undeveloped and RARE II areas are discussed in Chapter Four of the FEIS and in supplemental documentation found in the Project Record. Alternative 2 was developed to address this issue.

The number of roadless acres and undeveloped acres altered by the proposed management actions are 5,146; 4,556; 1,841; and 4,458 for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3 respectively. No roadless or undeveloped acres would be altered by commercial timber harvest activities.

The acres on which vegetation would be cut or slashed to create a sufficient fuel bed to carry management-ignited fire are 3,755; 3,890; 131; and 3,792 for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3 respectively.

The consequences of management actions on roadless and undeveloped areas are primarily related to visitor experience and expectations. I have weighed the impacts to the landscape and the experience of recreationists. I find that treatments are necessary to perpetuate ecological conditions that people value in roadless and undeveloped areas, and impacts are short-term. In the selected alternative, any visual impact of cut stumps and ends will be ameliorated by prescribed fire.

I believe the application of management actions disclosed in the Proposed Action will provide ample opportunity for wildland recreation opportunities and will move current ecological conditions toward their Desired Future Condition.

ISSUE 7. Use and application of non-native seed in some burn areas might be detrimental to the natural ecosystem.

This issue relates to the use of non-native seed as a cover for bare-ground conditions resulting from management activities such as burning. Alternative 2 was developed to respond to this issue.

The consequences of the use of native and non-native seed in the action alternatives related to the loss of native species, reduction of intrinsic biological diversity, spread of noxious weeds, and tardiness in establishing appropriate ground cover to inhibit erosion. Maintaining, perpetuating and reestablishing native species on National Forest lands is important, however, I must consider the relative risk of other components of the ecosystem, such as ground cover, soil properties, moisture regimes and slope.

My decision emphasizes the use of native seed where seeding is needed to restore disturbed areas. Seeding will be used on sites that might experience unacceptable levels of erosion after burning and before natural vegetation recovery, and in areas that best benefit big-game winter range and help reduce dependency of big game on private land. Criteria for selecting non-native plant species are: species that are not aggressive in dominating a site (to the detriment of native species), and species that do not have a tendency to spread off site and colonize adjoining areas. I believe selection of nonaggressive non-natives will ensure that native species persist and contribute to the ecological functions that have evolved on these sites.

In addition to the issues above, I have looked closely at the following concerns in arriving at my decision:

INTERIM ROADS RULE (36 CFR 212)

The Interim Roads Rule became effective March 1, 1999. It suspended road construction and reconstruction in certain areas of land administered by the National Forest System. The FEIS clearly

discloses that the actions described in my decision comply with the Interim Roads Rule. There is no road construction or reconstruction in my selected alternative.

GRAND STAIRCASE-ESCALANTE NATIONAL MONUMENT
The Project Area shares a common boundary with the Grand Staircase-Escalante National Monument (GSENM) of about 4.75 miles. The FEIS discloses effects of prescribed burn actions on the GSENM. The impact on visual quality would be subtle changes in vegetation patterns in the short term, and enhanced visual diversity over the long term. The most observable change from within the GSENM would be sagebrush burning along the boundary. Prescribed fire would result in natural-appearing openings distributed in a mosaic pattern across the area. Some smoke dispersal into the GSENM is anticipated; smoke emissions will comply with state regulations and the Clean Air Act. Water and sediment rates would increase slightly as a result of the proposed treatments, but remain well within soil loss tolerance thresholds. These effects will occur during times when prescribed fire actions are being implemented. I have considered this, and believe that achieving the long-term desired outcomes of this project is important and outweighs short-term effects.

ECONOMICS
I have evaluated the investments necessary to restore desired vegetative conditions within the project area. I believe the short-term investments will contribute to the long-term ecological goals stated in the project purpose. Investments will be offset by improved ecological conditions and reduced risk of large, high-intensity, stand-replacing fire.

B. Responsiveness to Environmental Quality and the Purpose and Need

The Purpose and Need of the Proposed Action is stated in FEIS Chapter One, pages 1-1 through 1-4. I believe that use of prescribed fire, with seeding of forbs and grasses, will best meet the Purpose and Need.

Chapter Three of the FEIS describes the resources within the Pretty Tree Bench Project Area. Vegetative conditions have changed through time, primarily because of the exclusion of fire. The diversity of age class and structure historically represented on the landscape has diminished. Varieties of age and vegetation structure are important for diversity of plant and wildlife habitats. Continued lack of disturbance within the project area would further increase stand densities, shade-tolerant species, forest floor accumulations of litter, mortality, and loss of certain ecosystem components (oak, seral species dominated mixed conifer and aspen). These changes would increase the potential for stand-replacing wildfire while decreasing the diversity of seral stages and stand structures. A landscape dominated by old growth, such as pinyon/juniper, does not provide suitable habitat for plants or wildlife species that depend upon early seral conditions.

Chapter Four of the FEIS describes the direct, indirect, and cumulative effects to resources by alternative, including the no-action alternative. I have reviewed the effects of the alternatives, and believe this decision provides the best opportunity in the long term to establish aspen regeneration, create needed vegetative age structure (including early seral conditions for some pinyon/juniper), delay conifer succession so that aspen will persist on the landscape, and reduce the probability of stand-replacing wildfire. The mitigations described in Chapter Two of the FEIS were specifically designed for the project area. These mitigations will reduce impacts of the Proposed Actions to wildlife and wildlife

habitat, soil and water resources, and important visual, recreation, cultural, and roadless/undeveloped resources.

This decision moves the project area toward desired future condition, meets the purpose and need, addresses the issues, and provides for environmental protection through mitigation measures.

C. Economic Efficiency

I have considered the costs and benefits of implementing this decision. The cost of this sort of project generally comprises the cost of cutting understory trees in preparation of burning, and the costs of burning and seeding. It is difficult to quantify costs and benefits associated with the ecological benefits discussed in the FEIS. The cost for reforesting aspen acres will be about $31.00/acre (this includes only burn costs, not associated planning expenses). I consider this an acceptable cost for perpetuating aspen in the project area.

D. Consistency with the Agency Mission and the Natural Resource Agenda

The mission of the Forest Service is to manage lands for a variety of human needs while providing for healthy ecosystems. Ecosystem management is an ecological approach to natural resource management. It addresses both biological and physical needs of an ecosystem, and the social and economic needs of the humans who use it. I believe that this decision benefits all the vegetation types described, and the ecosystem. Forest health, productivity, diversity, and long-term scenic values are enhanced while providing for a variety of uses.

A Gradual Unfolding of a National Purpose: A Natural Resource Agenda for the 21st Century focuses on four key areas: Watershed Health and Restoration, Sustainable Forest Ecosystem Management, Forest Roads, and Recreation. This decision contributes to the agenda in these ways:

Watershed Health and Restoration: Management actions will fortify the resiliency of the watersheds in Pretty Tree Bench Project Area to natural events such as floods, fire and drought. In addition, these watersheds would be more capable of absorbing the impacts of human-induced disturbances.

Sustainable Forest Ecosystem Management: Management actions will help sustain ecosystems by reducing forest fuel buildups, creating new and different patterns of disturbance in vegetation, and reducing air pollution from smoke and particulates by controlling the timing and intensity of burn. I am keenly aware of the importance of aspen in the biological diversity of forests in the Intermountain West. I am satisfied that the management actions described in the selected alternative will sustain and perpetuate aspen indefinitely.

Forest Roads: Management actions do not include the construction or reconstruction of any roads.

Recreation: Management actions will improve the quality of the recreational setting by enhancing color, form, texture, and line in the landscape of Pretty Tree Bench; and maintaining the character of inventoried and undeveloped lands in the Cumulative Effects Analysis Area. These actions will help an increasingly urban population enjoy and appreciate the natural world.

E. Reason for Multiple Decisions

The Pretty Tree Bench Project proposal comprises three components: aspen harvest, prescribed fire, and travel management. Since publication of the Notice of Availability for the Draft Environmental Impact Statement for the Pretty Tree Bench Vegetation Management Project (May 21, 1999), one substantial policy change has occurred specific to travel management.

The Forest Service has been working on a transportation policy to guide management of National Forest road systems. The Interim Roads Rule (March 1, 1999) initiated policy development for the transportation system. Interim manual direction requires use of a Roads Analysis Process (RAP) to guide and inform decisionmakers in their choices regarding road management. The travel management actions proposed in the FEIS will be deferred until completion of the RAP for the Pretty Tree Bench Project Area. A separate decision will be made for travel management and OHV trail construction after a Supplement to the Final Environmental Impact Statement (FEIS) is released for review and comment.

In reviewing the FEIS, the project components are independent of each other, can proceed independently, and are not interdependent parts or components of a larger action. I will issue separate decisions for each of the project components.

IV. PUBLIC INVOLVEMENT

A. Public Participation

Public involvement for the Pretty Tree Bench Vegetation Project began on January 23, 1998, when a letter and scoping notice describing the Proposed Action were mailed to all parties who had expressed an interest in vegetation management proposals on the Escalante Ranger District. This original proposal included treatments associated with the pinyon/juniper and sagebrush vegetation types.

Based on comments received and additional analysis completed by Forest Service specialists, the scope of the original burn proposal was expanded to include treatments in other vegetation types, and to analyze travel management options as described in the Proposed Action. On June 30, 1998 a new scoping notice was mailed which amended the original proposal.

These scoping activities yielded 21 written responses and 2 telephone responses. Members of the Interdisciplinary Team (IDT) briefed the City Council of Boulder, Utah on February 4, 1998. On September 15, 1998, the IDT met with interested individuals and received their comments.

The Notice of Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register on November 16, 1998. The Notice of Availability (NOA) was published in the Federal Register on May 21, 1999, with a comment review due date of July 6, 1999. Letters were sent to tribal governments in the Dixie National Forest's area of influence and within the tribes' aboriginal territories; they were asked about their interest in National Forest projects and their desire to consult under new National Historic Preservation Act (NHPA) regulations. A complete record of all public involvement is in the project file.

I appreciate the time and effort of all parties who participated in the analysis process. I especially appreciate those who took time to participate in public meetings. The information provided by interested parties has greatly helped our understanding of issues and concerns regarding this proposal.

B. Issues Identified

The IDT analyzed the scoping responses and categorized them into the following major issues:

Issue 1: Use of timber harvest as a method for achieving the age-class and structural diversity.

Issue 2: Maintaining an undeveloped character within mapped RARE II areas, roadless inventory areas of 1983/84, and roadless inventory areas of 1997.

Issue 3: Maintaining an undeveloped character only in those portions of the RARE II area and other roadless inventory areas which still retain undeveloped characteristics.

Issue 4: Correcting resource damage resulting from vehicular traffic on portions of Road Draw Road where inadequate water drainage from the road exists and where the road crosses a wet meadow.

Issue 5: Continued motorized use of Road Draw Road and development of an OHV trail loop could be an intrusion within the roadless areas mentioned in Issue 3 above.

Issue 6: Closure of Road Draw Road. The County considers Road Draw Road as a RS-2477 road, and therefore, has jurisdiction over the road. Road Draw Road is recorded as a historical overland route connecting the towns of Loa and Bicknell in Wayne County to the Town of Boulder in Garfield County.

Issue 7: Use and application of non-native plant seeds to some burn areas might be detrimental to the natural ecosystem.

C. Public Comments on the DEIS

On May 6, 1999, the Pretty Tree Bench Vegetation Management Project Draft Environmental Impact Statement (DEIS) was sent to people who had commented on the project, and elected officials. Eight letters from 7 parties were received during the review period of May 21 through July 6, 1999. Since then, 45 letters and 3 telephone calls have been received. No comments were received from tribal governments. All comments were individually assessed. Documentation of public involvement work is disclosed in the FEIS and the project file.

V. ALTERNATIVES CONSIDERED

The analysis for the Pretty Tree Bench Vegetation Project considered five alternatives in detail. The effects of these alternatives are discussed in Chapter Four of the FEIS. Three additional alternatives were considered by the IDT, but not studied in detail. The rationale for elimination of alternatives not considered is discussed in Chapter Two of the FEIS. The alternatives not studied in detail and the five alternatives described in detail are fully discussed in Chapter Two of the FEIS. The following is a brief discussion:

A. Alternatives Eliminated from Detailed Study

- Use of chaining and roller chopping for pretreatment of fuels within the pinyon/juniper burn areas.
- Use of commercial timber sales to accomplish all of the aspen regeneration treatments.
- Reducing livestock grazing levels and allowing natural fire to provide disturbance.

B. Alternatives Considered in Detail

Alternatives considered in detail were formulated from issues identified during the scoping process and comments received during the DEIS review period. They were also based on project objectives and goals, and objectives and desired future conditions in the LRMP.

No Action: Proposed vegetation treatment activities would not take place at this time. Consideration of such activities in the future would not be precluded. Existing activities such as personal use fuelwood cutting, livestock grazing, fire protection, and recreational off-road motorized and nonmotorized use would continue. Big-game winter range would not be enhanced, the risk of catastrophic fire would remain high, and a diversity of vegetative structures would not be achieved. The No-Action Alternative does not meet the purpose and need defined for this project. I have not selected this alternative because it is important to reduce fire risk, create vegetative diversity, and to enhance winter range for wildlife.

Alternative 1: This alternative excludes commercial harvest of aspen; it provides for aspen regeneration only through burning. It would reconstruct minor portions of Road Draw Road. Seeding practices, road closures, and OHV trail construction are the same as in the Proposed Action. This alternative includes burning the modest number of acres (300) designated for commercial timber harvest in the Proposed Action. Some comments were completely opposed to management of aspen by any commercial methods; others demanded that commercially harvested acres be held to the least number of acres analyzed. I have evaluated those concerns based on the discussion of Environmental Consequences (Chapter IV, FEIS). I believe that the number of acres designated for commercial aspen harvest is appropriate to achieve the disturbance needed to sustain this critical species. Moreover, I believe that commercial harvesting can be accomplished with sensitivity to concerns raised by participants in this environmental analysis process and without constructing or reconstructing a road system to access these acres. This type of management activity is consistent with the Goals and Objectives, Management Direction and Standard and Guidelines contained in the Land and Resource Management Plan for the Dixie National Forest. Therefore, I am not selecting this alternative.

Alternative 2: This alternative excludes cutting within unroaded areas, and reduces commercial harvest of aspen to 166 acres. The acres of aspen harvest are located within a developed area as defined by the public. It provides for reseeding only with native seed, and would close the Road Draw Road. The OHV trail would not be constructed. I have not selected this alternative because native seed sometimes will not provide ground protection or protection from erosion as well as seed that establishes more quickly. I have emphasized the use of native seed, but it may be necessary to apply non-native seed to those areas where rapid plant establishment is needed. Moreover, this alternative was not selected because treating only 300-350 acres of pinyon/juniper will not create an adequate younger age structure needed to attain desirable plant and vegetation conditions.

Alternative 3: This is similar to Alternative 2, except it would reconstruct Road Draw Road and close it seasonally; use the allotment fence as the unroaded boundary and allow treatment cuts only west of it; and allow commercial aspen harvest of 204 acres. Seeding practices are the same as in the Proposed Action. The OHV trail would be constructed and seasonally closed. Commercial aspen harvest of 204 acres is insufficient to move the vegetative communities of Pretty Tree Bench toward the desired mix of age classes, size classes and species. I alluded earlier to comments that completely opposed management of aspen by any commercial methods, or demanded that commercially harvested acres be held to the least number of acres analyzed. I evaluated them based on the discussion of Environmental Consequences (Chapter IV, FEIS). I believe the number of acres designated for commercial harvest activities is <u>not</u> sufficient to effect the disturbance necessary to sustain aspen. Therefore, I am not selecting this alternative.

VI. FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS

I have considered the environmental consequences (FEIS, Chapter Four). The decision to apply prescribed fire on the landscape as described in the Proposed Action is consistent with other applicable laws and regulations as detailed in the FEIS, Chapter Four, pages 4-199 through 4-208.

A. Consistency with the Forest Plan Direction

Regulations and Requirements: All resource plans are to be consistent with the Dixie National Forest Land and Resource Management Plan (Forest Plan) [16 U.S.C. 1604 (i)]. The Forest Plan guides all natural resource management activities [36 Code of Federal Regulations (CFR) 219.1 (b)]. All administrative activities affecting the National Forest must be based on the Forest Plan [36 CFR 219.10 (e)].

The Forest Plan was approved in September, 1986. The FEIS for the Pretty Tree Bench Vegetation Project tiers to the FEIS for the Forest Plan. The Forest Plan provides overall guidance for management activities by specifying goals and objectives, desired future conditions, management direction and standards and guidelines.

The features of this decision have been evaluated for consistency with the goals and objectives, and resource standards and guidelines of the Forest Plan. All management activities included in the decision comply with--and in many cases exceed--Forest Plan goals, objectives and standards.

The Dixie National Forest recently began an amendment to the Forest Plan to implement the Scenery Management System. If the amendment is adopted before implementation of this project, specific management area direction will be compared and analysis completed to ensure compliance with scenic integrity objectives and associated standard and guidelines.

The Utah National Forests are working together on an amendment to each forest's LRMP to guide restoration and maintenance of fire-adapted ecosystems through wildland fire use and prescribed fire, consistent with land uses and historic fire regimes. The decision for the Pretty Tree Bench Project Area is consistent with the Proposed Action and alternatives that will soon be published in the environmental assessment for the amendment.

The Utah National Forests have initiated a LRMP amendment process to integrate the Goshawk Conservation Strategy into existing LRMP standards, guidelines, and desired conditions. The Proposed Action is consistent with the conservation strategy and with the alternatives described in the Utah Northern Goshawk Project Environmental Assessment.

B. Consistency with the National Forest Management Act

This decision is consistent with the National Forest Management Act (NFMA) of 1976 in meeting the management requirements detailed in implementing regulations at 36 CFR 219.27 (a) through (g). Specifically, the management prescriptions for the decision provide for thoughtful management of soil, water, air, wildlife, fishery resources and other uses under 36 CFR 219.27 (a)(1) through (12). Additional discussion of NFMA consistency can be found on pages 4-199 to 4-202 of the FEIS.

C. Consistency with Other Laws and Regulations

Clean Water Act - The Clean Water Act requires each state to implement its own water quality standards. The State of Utah's Water Quality Antidegradation Policy requires maintenance of water quality to protect existing instream Beneficial Uses on streams designated as Category 1 High Quality Water. All surface waters geographically located within the outer boundaries of the Dixie National Forest, whether on private or public lands, are designated as High Quality Waters (Category 1). This means they will be maintained at existing high quality. New point sources will not be allowed, and non-point sources will be controlled to the extent feasible through implementation of Best Management Practices (BMPs) or regulatory programs (Utah Division of Water Quality 1994). The State of Utah and the Forest Service have agreed through a 1993 Memorandum of Understanding to use Forest Plan Standards & Guidelines and the Forest Service Handbook (FSH) 2509.22 Soil and Water Conservation Practices (SWCPs) as the BMPs. The use of SWCPs as the BMPs meet the water quality protection elements of the Utah Nonpoint Source Management Plan and the Nonpoint Source Management Plan for Silvicultural Activities.

The Beneficial Uses of water in the streams draining the project area would be maintained during and following project implementation through the proper implementation of BMPs (SWCPs) as described in Chapters Two and Four.

Executive Order 11990 Of May 1977 - This order requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In compliance with this order, Forest Service direction requires that an analysis be completed to determine whether adverse impacts would result.

The location of wetland areas in the project area were identified in the delineation and inventory of sensitive watershed areas. Impacts from adjacent or nearby areas will be prevented through implementation of SWCPs as described in Chapter Two (Mitigations). Any of the alternatives would be in compliance with Executive Order 11990.

Executive Order 11988 Of May, 1977 - This order requires the Forest Service to provide leadership and to take action to (1) minimize adverse impacts associated with occupancy and modification of floodplains and reduce risks of flood loss, (2) minimize impacts of floods on human safety, health, and welfare, and (3) restore and preserve the natural and beneficial values served by flood plains. In

compliance with this order, the Forest Service requires an analysis be completed to determine the significance of Proposed Actions in terms of impacts to flood plains.

Impacts from adjacent or nearby areas will be prevented through implementation of SWCP's as described in Chapter Two. Impacts related to trail crossings will be minimized or prevented through implementation of SWCP's. Therefore any of the proposed alternatives will be in compliance with Executive Order 11988.

Endangered Species Act Of 1973, As Amended - Based on discussions in Chapters Three and Four concerning threatened and endangered plant and wildlife species; correspondence with USFWS; and detailed discussions contained in the Biological Assessment located in the Project File, it has been determined that there would be no adverse effects to populations of threatened, endangered, or proposed wildlife or plant species with the decision.

American Antiquities Act Of 1906 and Historic Preservation Act of 1966 - Based on the discussion in Chapters Three and Four concerning Heritage Resources and the project file documentation, it has been determined that there will be no measurable effects to any Historic Properties with the decision.

Clean Air Act, As Amended In 1977 - Based on discussions in Chapters Three and Four concerning Air Quality, it has been determined that there would be no measurable effects to air quality in Class I or II airsheds with the decision.

Forest and Rangeland Renewable Resources Planning Act of 1974 - Section 10, Part C of this Act, under Transportation System, states that "...any road constructed on National Forest System Lands in connection with timber contracts or permits shall be designed with the goal of reestablishing vegetative cover on the roadway and areas where the vegetative cover has been disturbed by the construction of the road, within 10 years after the termination of the contract, permit, or lease either through artificial or natural means."

There will be no roads constructed with this decision. This provision is met.

Civil Rights - Based on comments received during scoping and the comment period for the DEIS, no conflicts have been identified with other Federal, State, or local agencies or with Native Americans, other minorities, women, or civil rights of any United States citizen.

Secretary of Agriculture Memorandum, 1827 - This decision is in conformance for prime farmland, rangeland, and forest land.

Energy - This decision would not have unusual energy requirements.

Mining - This decision would have no effects on the availability of lands for mining, under federal mining laws and regulations.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." - This order requires the Forest Service to take action to the extent practicable and permitted by law to make achieving environmental justice part of its mission by identifying and addressing as appropriate, disproportionately high and adverse human health effects, of its programs policies and activities on minority populations and low-income populations in the United

States and territorial possessions. In compliance with this Executive Order, The Dixie National Forest, through intensive Scoping and Public Involvement attempted to identify interested and affected parties, including minority and low-income populations for this project. The Forest defined a range of alternatives to be evaluated and analyzed the consequence of the alternatives on the quality of the human environment. A comment period was held for 45-days for the Draft Environmental Impact Statement following the U.S. Environmental Protection Agency's publication of the Notice of Availability in the Federal Register. The land described in this analysis is managed by the USDA Forest Service as the Dixie National Forest. The decision for this document will not amend or preclude any existing private or treaty rights in the Pretty Tree Bench Project Area. No minority or low-income populations were identified during public involvement activities.

VII. ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative best fulfills the following six goals as stated in the National Environmental Policy Act (Title 1, Section 151 (b)):

1. Fulfills the responsibilities of each generation as trustee of the environment for succeeding generations.

2. Assures all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings.

3. Attains the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.

4. Preserves important historic, cultural and natural aspects of our national heritage, and maintains wherever possible an environment which supports diversity and a wide variety of individual choices.

5. Achieves a balance between the human population and resource uses which permits high standards of living and a wide sharing of life's amenities.

6. Enhances the quality of renewable resources and approaches the maximum attainable recycling of depleted resources.

The Proposed Action is the environmentally preferred alternative. My decision, which selects prescribed fire from the Proposed Action as the means for vegetation treatment, gives a balanced approach to the attainment of these goals.

VIII. IMPLEMENTATION AND ADMINISTRATIVE REVIEW

This decision is subject to appeal pursuant to Forest Service regulations at 36 CFR 215.7. A written notice of appeal must be postmarked or received by the Appeal Deciding Officer, Regional Forester Jack Blackwell, USDA Forest Service, 324 25th Street, Ogden, Utah 84401, within 45 days after the date this notice is published in The Daily Spectrum, St. George, Utah. Appeals must meet the content requirement of 36 CFR 215.14. If no appeal has been filed, this decision will be implemented 5 days after the close of the appeal filing period.

For further information on this project, contact Kevin R. Schulkoski, District Ranger, Escalante Ranger District, 755 West Main Street, Escalante Utah, 84726, or phone (435) 826-5400,

Mary Wagner
MARY WAGNER
Forest Supervisor
Dixie National Forest

MARCH 10, 2000
Date

Proposed Action: Prescribe Burn Areas